Agilent 1200 Infinity Series Variable Wavelength Detectors

User Manual

Agilent Technologies

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In This Guide

This manual covers
the Agilent 1290 Infinity Variable Wavelength Detector (G1314E),
the Agilent 1260 Infinity Variable Wavelength Detector (G1314F) and
the Agilent 1200 series Variable Wavelength Detector (G1314D) (obsolete).

Find information on other Agilent Variable Wavelength Detectors in separate manuals.

1 Introduction to the Variable Wavelength Detector

This chapter gives an introduction to the detector, instrument overview and internal connectors.

2 Site Requirements and Specifications

This chapter gives information on environmental requirements, physical and performance specifications.

3 Installing the Detector

This chapter describes the installation of the detector.

4 LAN Configuration

This chapter provides information on connecting the detector to the Agilent ChemStation PC.

5 Using the Detector

This chapter provides information on how to set up the detector for an analysis and explains the basic settings.

6 How to optimize the detector

This chapter gives hints on how to select the detector parameters and the flow cell.

7 Troubleshooting and Diagnostics

Overview about the troubleshooting and diagnostic features.

8 Error Information

This chapter describes the meaning of detector error messages, and provides information on probable causes and suggested actions how to recover from error conditions.

9 Test Functions

This chapter describes the detector's built in test functions.

10 Maintenance and Repair

This chapter provides general information on maintenance and repair of the detector.

11 Parts and Materials for Maintenance

This chapter provides information on parts for maintenance.

12 Identifying Cables

This chapter provides information on cables used with the Agilent modules.

13 Appendix

This chapter provides addition information on safety, legal and web.

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This chapter gives an introduction to the detector, instrument overview and internal connectors.

Introduction to the Detector

The Agilent variable wavelength detectors described in this manual are designed for highest optical performance, GLP compliance and easy maintenance with:

- data rate up to 20 Hz for standard-HPLC (G1314D), see Table 25 on page 113
- higher data rate up to 80 Hz for fast-HPLC (G1314F), see Table 26 on page 113
- higher data rate up to 160 Hz for ultra-fast-HPLC (G1314E), see Table 27 on page 114
- data recovery card DRC (G1314E) gives unique "data-never-lost" insurance "Run Recovery Settings" on page 115,
- deuterium lamp for highest intensity and lowest detection limit over a wavelength range of 190 to 600 nm,
- optional flow-cell cartridges (standard 10 mm, 14 µL; high pressure 10 mm, 14 µL; micro 3 mm, 2 µL; semi-micro 6 mm, 5 µL) are available and can be used depending on the application needs (other types may be introduced later),
- easy front access to lamp and flow cell for fast replacement,
- electronic identification of flow cell and lamp with RFID (Radio Frequency Identification) tag for unambiguous identification,
  - lamp information: part number, serial number, production date, ignitions, burn time
  - cell information: part number, serial number, production date, nominal path length, volume, maximum pressure
- built-in electronic temperature control (ETC) for improved baseline stability, and
- built-in holmium oxide filter for fast wavelength accuracy verification.

NOTE These detectors cannot be operated with a G1323B Control Module. Use the Instant Pilot (G4208A) as local controller.

For specifications refer to Table 14 on page 43.

Optical System Overview

The optical system of the detector is shown in the figure below. Its radiation source is a deuterium-arc discharge lamp for the ultraviolet (UV) wavelength range from 190 to 600 nm. The light beam from the deuterium lamp passes through a lens, a filter assembly, an entrance slit, a spherical mirror (M1), a grating, a second spherical mirror (M2), a beam splitter, and finally through a flow cell to the sample diode. The beam through the flow cell is absorbed depending on the solutions in the cell, in which UV absorption takes place, and the intensity is converted to an electrical signal by means of the sample photodiode. Part of the light is directed to the reference photodiode by the beam splitter to obtain a reference signal for compensation of intensity fluctuation of the light source. A slit in front of the reference photodiode cuts out light of the sample bandwidth. Wavelength selection is made by rotating the grating, which is driven directly by a stepper motor. This configuration allows fast change of the wavelength. The cutoff filter is moved into the lightpath above 370 nm to reduce higher order light.

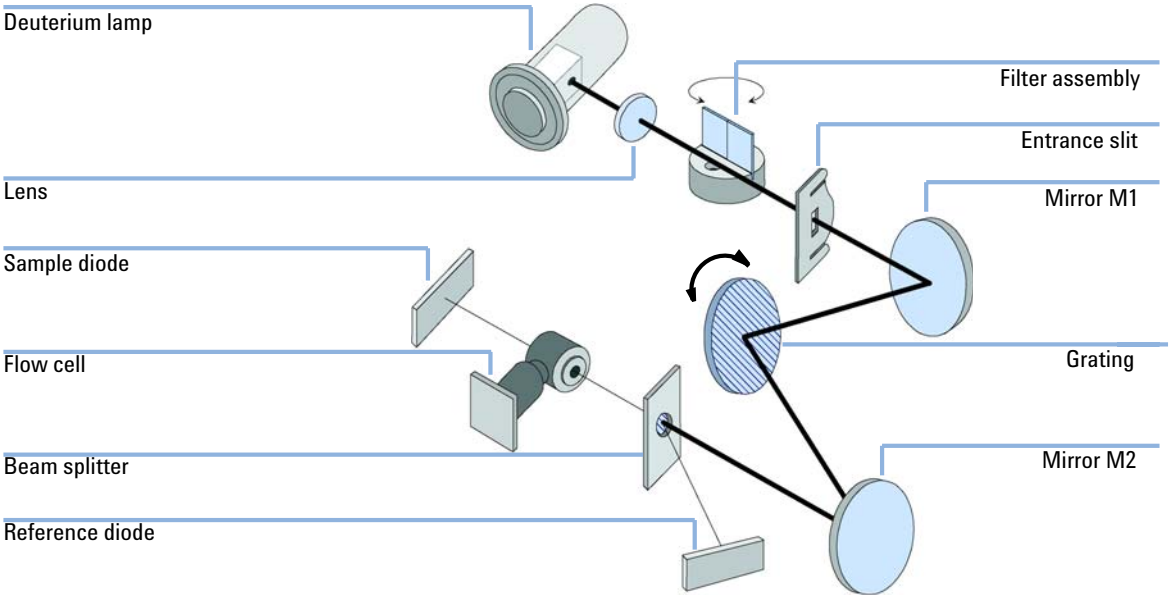

Figure 1 Optical Path of the Variable Wavelength Detector

Flow Cell

A variety of flow-cell cartridges can be inserted using the same quick and simple mounting system.

The flow cells have an integrated RFID tag that contains the flow cell specific information (e.g. part number, cell volume, path length, ...). A RFID tag reader reads out this information and transfers it to the user interface.

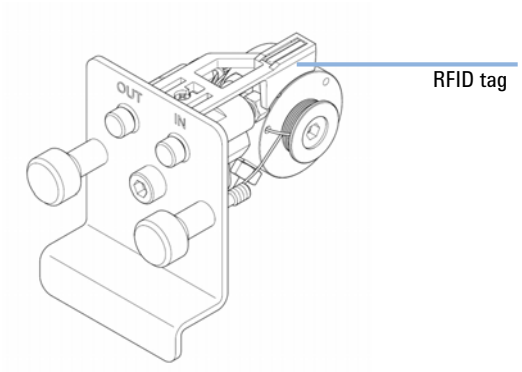

Figure 2 Flow Cell with RFID tag

Table 1 Flow Cell Data

	STD	Semi-micro	Micro	High Pressure	
Maximum pressure	40 (4)	40 (4)	120 (12)	400 (40)	bar
Path length	10 (conical)	6 (conical)	3 (conical)	10 (conical)	mm
Volume	14	5	2	14	µL
Inlet i.d.	0.17	0.17	0.12	0.17	mm
Inlet length	750	750	310	310	mm
Outlet i.d.	0.25	0.25	0.17	0.25	mm
Outlet length	120	120	120	120	mm
Materials in contact with solvent	SST, quartz, PTFE, PEEK	SST, quartz, PTFE	SST, quartz, PTFE	SST, quartz, Kapton	

Lamp

The light source for the UV wavelength range is a deuterium lamp. As a result of plasma discharge in a low pressure deuterium gas, the lamp emits light over the 190 – 600 nm wavelength range.

The lamp has an integrated RFID tag that contains the lamp specific information (e.g. part number, burn time, ...). A RFID tag reader reads out this information and transfers it to the user interface.

Source Lens Assembly

The source lens receives the light from the deuterium lamp and focuses it onto the entrance slit.

Entrance Slit Assembly

The entrance slit assembly has an exchangeable slit. The standard one has a 1-mm slit. For replacement and calibration purposes to optimize the alignment, a slit with a hole is needed.

Filter Assembly

The filter assembly is electromechanically actuated. During wavelength calibrations it moves into the light path.

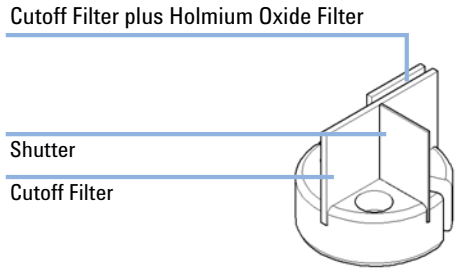

Figure 3 Filter Assemby

The filter assembly has two filters installed and is processor-controlled.

OPEN	nothing in light path at $\lambda < 370$ nm
CUTOFF	cut off filter in light path at $\lambda > 370$ nm
HOLMIUM	holmium oxide filter for wavelength check
SHUTTER	for measurement of dark current of photo diodes

A photo sensor determines the correct position.

Mirror Assemblies M1 and M2

The instrument contains two spherical mirrors (M1 and M2). The beam adjustable is vertically and horizontally. Both mirrors are identical.

Grating Assembly

The grating separates the light beam into all its component wavelengths and reflects the light onto mirror #2.

The stepper motor reference position is determined by a plate fitted onto the motor shaft, interrupting the beam of a photo sensor. The wavelength calibration of the grating is done at the zero order light position and at 656 nm, which is the emission line of the deuterium lamp.

Beam Splitter Assembly

The beam splitter splits the light beam. One part goes directly to the sample diode. The other part of the light beam goes to the reference diode.

Photo Diodes Assemblies

Two photo diode assemblies are installed in the optical unit. The sample diode assembly is located on the left side of the optical unit. The reference diode assembly is located in the front of the optical unit.

Photo Diode ADC (analog-to-digital converter)

The photo diode current is directly converted to digital data direct photo current digitalization. The data is transferred to the detector main board . The photo diode ADC boards are located close to the photo diodes.

Early Maintenance Feedback (EMF)

Maintenance requires the exchange of components which are subject to wear or stress. Ideally, the frequency at which components are exchanged should be based on the intensity of usage of the instrument and the analytical conditions, and not on a predefined time interval. The early maintenance feedback (EMF) feature monitors the usage of specific components in the instrument, and provides feedback when the user-selectable limits have been exceeded. The visual feedback in the user interface provides an indication that maintenance procedures should be scheduled.

EMF Counter

The detector module provides a EMF counter for the lamp. The counter increments with lamp use, and can be assigned a maximum limit which provides visual feedback in the user interface when the limit is exceeded. Dependig on the lamp type the counter can be reset to zero after the lamp is exchanged.

Lamp Type	Counter Reset	Comment
lamp with RFID tag	NO	
lamp without RFID tag	YES	via LMD or Instant Pilot

The detector provides the following EMF counters:

- Deuterium Lamp On-Time
- Number of UV lamp ignitions

Using the EMF Counters

The user-settable EMF limits for the EMF counters enable the early maintenance feedback to be adapted to specific user requirements. The useful lamp burn time is dependent on the requirements for the analysis (high or low sensitivity analysis, wavelength etc.), therefore, the definition of the maximum limits need to be determined based on the specific operating conditions of the instrument.

Setting the EMF Limits

The setting of the EMF limits must be optimized over one or two maintenance cycles. Initially, no EMF limit should be set. When instrument performance indicates maintenance is necessary, take note of the values displayed by lamp counters. Enter these values (or values slightly less than the displayed values) as EMF limits, and then reset the EMF counters to zero. The next time the EMF counters exceed the new EMF limits, the EMF flag will be displayed, providing a reminder that maintenance needs to be scheduled.

NOTE This function is only available via LMD or Instant Pilot.

Instrument Layout

The industrial design of the module incorporates several innovative features. It uses Agilent's E-PAC concept for the packaging of electronics and mechanical assemblies. This concept is based upon the use of expanded polypropylene (EPP) layers of foam plastic spacers in which the mechanical and electronic boards components of the module are placed. This pack is then housed in a metal inner cabinet which is enclosed by a plastic external cabinet. The advantages of this packaging technology are:

- virtual elimination of fixing screws, bolts or ties, reducing the number of components and increasing the speed of assembly/disassembly,
- the plastic layers have air channels molded into them so that cooling air can be guided exactly to the required locations,
- the plastic layers help cushion the electronic and mechanical parts from physical shock, and
- the metal inner cabinet shields the internal electronics from electromagnetic interference and also helps to reduce or eliminate radio frequency emissions from the instrument itself.

Electrical Connections

- The CAN bus is a serial bus with high speed data transfer. The two connectors for the CAN bus are used for internal module data transfer and synchronization.
- One analog output provides signals for integrators or data handling systems.
- The REMOTE connector may be used in combination with other analytical instruments from Agilent Technologies if you want to use features such as start, stop, common shut down, prepare, and so on.
- With the appropriate software, the RS-232C connector may be used to control the module from a computer through a RS-232C connection. This connector is activated and can be configured with the configuration switch.
- The power input socket accepts a line voltage of 100 – 240 VAC ± 10 % with a line frequency of 50 or 60 Hz. Maximum power consumption varies by module. There is no voltage selector on your module because the power supply has wide-ranging capability. There are no externally accessible fuses, because automatic electronic fuses are implemented in the power supply.

NOTE Never use cables other than the ones supplied by Agilent Technologies to ensure proper functionality and compliance with safety or EMC regulations.

Rear View of the Module

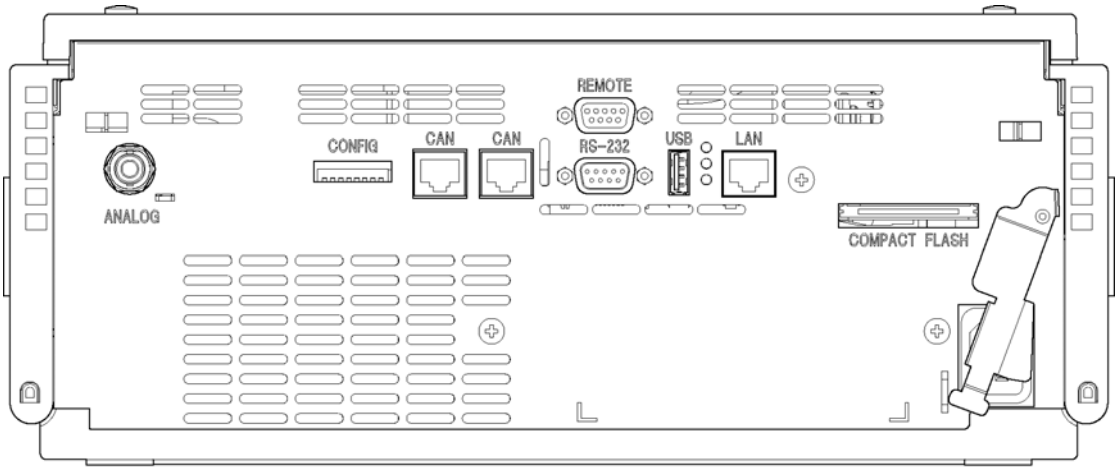

Figure 4 Rear View of Detector

NOTE The Compact Flash card slot is used for the G1314E VWD only.

Information on Instrument Serial Number

Serial Number Information 1200 Series and 1290 Infinity

The serial number information on the instrument labels provide the following information:

CCYWWSSSSS	Format
CC	country of manufacturing • DE = Germany • JP = Japan • CN = China
YWW	year and week of last major manufacturing change, e.g. 820 could be week 20 of 1998 or 2008
SSSSS	real serial number

Serial Number Information 1260 Infinity

The serial number information on the instrument labels provide the following information:

CCXZZ00000	Format
CC	Country of manufacturing (DE Germany)
X	Alphabetic character A-Z (used by manufacturing)
ZZ	Alpha-numeric code 0-9, A-Z, where each combination unambiguously denotes a module (there can be more than one code for the same module)
00000	Serial number

Interfaces

The Agilent 1200 Infinity Series modules provide the following interfaces:

Table 2 Agilent 1200 Infinity Series Interfaces

Module	CAN	LAN/BCD (optional)	LAN (on-board)	RS-232	Analog	APG Remote	Special
Pumps							
G1310B Iso Pump G1311B Quat Pump G1311C Quat Pump VL G1312B Bin Pump G1312C Bin Pump VL 1376A Cap Pump G2226A Nano Pump	2	Yes	No	Yes	1	Yes	
G4220A/B Bin Pump	2	No	Yes	Yes	No	Yes	
G1361A Prep Pump	2	Yes	No	Yes	No	Yes	CAN-DC- OUT for CAN slaves
Samplers							
G1329B ALS G2260A Prep ALS	2	Yes	No	Yes	No	Yes	THERMOSTAT for G1330B
G1364B FC-PS G1364C FC-AS G1364D FC-µS G1367E HiP ALS G1377A HiP micro ALS G2258A DL ALS	2	Yes	No	Yes	No	Yes	THERMOSTAT for G1330B CAN-DC- OUT for CAN slaves
G4226A ALS	2	Yes	No	Yes	No	Yes	
Detectors							
G1314B VWD VL G1314C VWD VL+	2	Yes	No	Yes	1	Yes	
G1314E/F VWD	2	No	Yes	Yes	1	Yes	

Table 2 Agilent 1200 Infinity Series Interfaces

Module	CAN	LAN/BCD (optional)	LAN (on-board)	RS-232	Analog	APG Remote	Special
G4212A/B DAD	2	No	Yes	Yes	1	Yes	
G1315C DAD VL+ G1365C MWD G1315D DAD VL G1365D MWD VL	2	No	Yes	Yes	2	Yes	
G1321B FLD G1362A RID	2	Yes	No	Yes	1	Yes	
G4280A ELSD	No	No	No	Yes	Yes	Yes	EXT Contact AUTOZERO
Others							
G1316A/C TCC	2	No	No	Yes	No	Yes	
G1322A DEG	No	No	No	No	No	Yes	AUX
G1379B DEG	No	No	No	Yes	No	No	AUX
G4227A Flex Cube	2	No	No	No	No	No	
G4240A CHIP CUBE	2	Yes	No	Yes	No	Yes	CAN-DC- OUT for CAN slaves THERMOSTAT for G1330A/B (NOT USED)

NOTE The detector (DAD/MWD/FLD/VWD/RID) is the preferred access point for control via LAN. The inter-module communication is done via CAN.

- CAN connectors as interface to other modules
- LAN connector as interface to the control software
- RS-232C as interface to a computer
- REMOTE connector as interface to other Agilent products
- Analog output connector(s) for signal output

Overview Interfaces

CAN

The CAN is inter-module communication interface. It is a 2-wire serial bus system supporting high speed data communication and real-time requirement.

LAN

The modules have either an interface slot for an LAN card (e.g. Agilent G1369A/B LAN Interface) or they have an on-board LAN interface (e.g. detectors G1315C/D DAD and G1365C/D MWD). This interface allows the control of the module/system via a connected PC with the appropriate control software.

NOTE If an Agilent detector (DAD/MWD/FLD/VWD/RID) is in the system, the LAN should be connected to the DAD/MWD/FLD/VWD/RID (due to higher data load). If no Agilent detector is part of the system, the LAN interface should be installed in the pump or autosampler.

RS-232C (Serial)

The RS-232C connector is used to control the module from a computer through RS-232C connection, using the appropriate software. This connector can be configured with the configuration switch module at the rear of the module. Refer to *Communication Settings for RS-232C*.

NOTE There is no configuration possible on main boards with on-board LAN. These are pre-configured for

- 19200 baud,
- 8 data bit with no parity and
- one start bit and one stop bit are always used (not selectable).

The RS-232C is designed as DCE (data communication equipment) with a 9-pin male SUB-D type connector. The pins are defined as:

Table 3 RS-232C Connection Table

Pin	Direction	Function
1	In	DCD
2	In	RxD
3	Out	TxD
4	Out	DTR
5		Ground
6	In	DSR
7	Out	RTS
8	In	CTS
9	In	RI

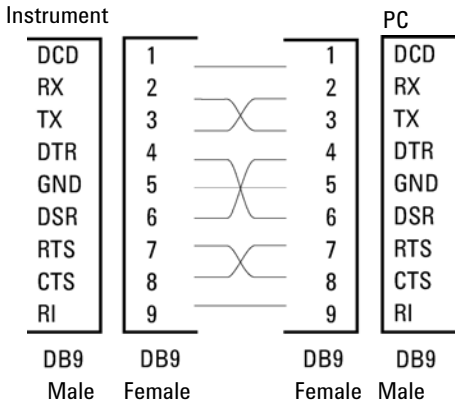

Figure 5 RS-232 Cable

Analog Signal Output

The analog signal output can be distributed to a recording device. For details refer to the description of the module's main board.

APG Remote

The APG Remote connector may be used in combination with other analytical instruments from Agilent Technologies if you want to use features as common shut down, prepare, and so on.

Remote control allows easy connection between single instruments or systems to ensure coordinated analysis with simple coupling requirements.

The subminiature D connector is used. The module provides one remote connector which is inputs/outputs (wired- or technique).

To provide maximum safety within a distributed analysis system, one line is dedicated to **SHUT DOWN** the system's critical parts in case any module detects a serious problem. To detect whether all participating modules are switched on or properly powered, one line is defined to summarize the **POWER ON** state of all connected modules. Control of analysis is maintained by signal readiness **READY** for next analysis, followed by **START** of run and optional **STOP** of run triggered on the respective lines. In addition **PREPARE** and **START REQUEST** may be issued. The signal levels are defined as:

- standard TTL levels (0 V is logic true, + 5.0 V is false),
- fan-out is 10,
- input load is 2.2 kOhm against + 5.0 V, and
- output are open collector type, inputs/outputs (wired- or technique).

NOTE All common TTL circuits operate with a 5 V power supply. A TTL signal is defined as "low" or L when between 0 V and 0.8 V and "high" or H when between 2.0 V and 5.0 V (with respect to the ground terminal).

Table 4 Remote Signal Distribution

Pin	Signal	Description
1	DGND	Digital ground
2	PREPARE	(L) Request to prepare for analysis (for example, calibration, detector lamp on). Receiver is any module performing pre-analysis activities.
3	START	(L) Request to start run / timetable. Receiver is any module performing run-time controlled activities.
4	SHUT DOWN	(L) System has serious problem (for example, leak: stops pump). Receiver is any module capable to reduce safety risk.
5		Not used
6	POWER ON	(H) All modules connected to system are switched on. Receiver is any module relying on operation of others.
7	READY	(H) System is ready for next analysis. Receiver is any sequence controller.
8	STOP	(L) Request to reach system ready state as soon as possible (for example, stop run, abort or finish and stop injection). Receiver is any module performing run-time controlled activities.
9	START REQUEST	(L) Request to start injection cycle (for example, by start key on any module). Receiver is the autosampler.

Special Interfaces

Some modules have module specific interfaces/connectors. They are described in the module documentation.

Setting the 8-bit Configuration Switch

Setting the 8-bit Configuration Switch (On-Board LAN)

The 8-bit configuration switch is located at the rear of the module. Switch settings provide configuration parameters for LAN, serial communication protocol and instrument specific initialization procedures.

All modules with on-board LAN, e.g. G1315/65C/D, G1314D/E/F, G4212A/B, G4220A:

- Default is ALL switches DOWN (best settings) - Bootp mode for LAN.
- For specific LAN modes switches 3-8 must be set as required.
- For boot/test modes switches 1+2 must be UP plus required mode.

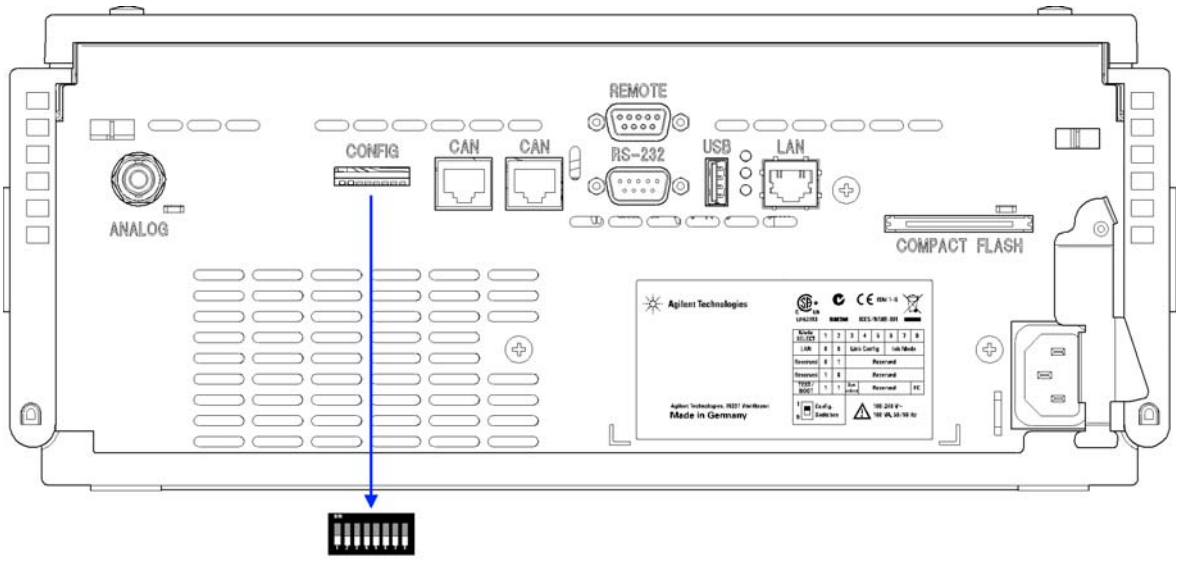

Figure 6 Location of Configuration Switch (example shows a G4212A DAD)

NOTE To perform any LAN configuration, SW1 and SW2 must be set to OFF. For details on the LAN settings/configuration refer to chapter LAN Configuration.

Table 5 8-bit Configuration Switch (with on-board LAN)

	Mode		Function					
	SW 1	SW 2	SW 3	SW 4	SW 5	SW 6	SW 7	SW 8
LAN	*0*	*0*	Link Configuration			Init Mode Selection		
Auto-negotiation			*0*	x	x	x	x	x
10 MBit, half-duplex			1	*0*	*0*	x	x	x
10 MBit, full-duplex			1	*0*	1	x	x	x
100 MBit, half-duplex			1	1	*0*	x	x	x
100 MBit, full-duplex			1	1	1	x	x	x
Bootp			x	x	x	*0*	*0*	*0*
Bootp & Store			x	x	x	*0*	*0*	1
Using Stored			x	x	x	*0*	1	*0*
Using Default			x	x	x	*0*	1	1
TEST	1	1	System					NVRAM
Boot Resident System			1					x
Revert to Default Data (Coldstart)			x	x	x			1

Legend:

0 (switch down), 1 (switch up), x (any position)

NOTE When selecting the mode TEST, the LAN settings are: Auto-Negotiation & Using Stored.

NOTE For explanation of "Boot Resident System" and "Revert to Default Data (Coldstart)" refer to "Special Settings" on page 34.

Setting the 8-bit Configuration Switch (without On-Board LAN)

The 8-bit configuration switch is located at the rear of the module.

Modules that do not have their own LAN interface (e.g. the TCC) can be controlled through the LAN interface of another module and a CAN connection to that module.

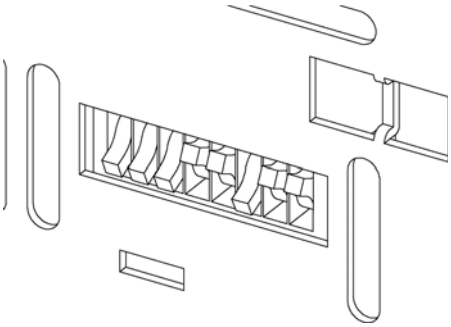

Figure 7 Configuration switch (settings depend on configured mode)

All modules without on-board LAN:

- default is ALL DIPS DOWN (best settings) - Bootp mode for LAN
- for boot/test modes DIPS 1+2 must be UP plus required mode

Switch settings provide configuration parameters for GPIB address, serial communication protocol and instrument specific initialization procedures.

NOTE With the introduction of the Agilent 1260 Infinity, all GPIB interfaces have been removed. The preferred communication is LAN.

NOTE The following tables represent the configuration switch settings for the modules without on-board LAN only.

Table 6 8-bit Configuration Switch (without on-board LAN)

Mode Select	1	2	3	4	5	6	7	8
RS-232C	0	1	Baudrate			Data Bits	Parity	
Reserved	1	0	Reserved					
TEST/BOOT	1	1	RSVD	SYS		RSVD	RSVD	FC

NOTE The LAN settings are done on the LAN Interface Card G1369A/B. Refer to the documentation provided with the card.

Communication Settings for RS-232C

The communication protocol used in the column compartment supports only hardware handshake (CTS/RTR).

Switches 1 in down and 2 in up position define that the RS-232C parameters will be changed. Once the change has been completed, the column instrument must be powered up again in order to store the values in the non-volatile memory.

Table 7 Communication Settings for RS-232C Communication (without on-board LAN)

Mode Select	1	2	3	4	5	6	7	8
RS-232C	0	1	Baudrate			Data Bits	Parity	

Use the following tables for selecting the setting which you want to use for RS-232C communication. The number 0 means that the switch is down and 1 means that the switch is up.

Table 8 Baudrate Settings (without on-board LAN)

Switches			Baud Rate	Switches			Baud Rate
3	**4**	**5**		**3**	**4**	**5**	
0	0	0	9600	1	0	0	9600
0	0	1	1200	1	0	1	14400
0	1	0	2400	1	1	0	19200
0	1	1	4800	1	1	1	38400

Table 9 Data Bit Settings (without on-board LAN)

Switch 6	Data Word Size
0	7 Bit Communication
1	8 Bit Communication

Table 10 Parity Settings (without on-board LAN)

Switches		Parity
7	8	
0	0	No Parity
1	0	Odd Parity
1	1	Even Parity

One start bit and one stop bit are always used (not selectable).

Per default, the module will turn into 19200 baud, 8 data bit with no parity.

Special Settings

The special settings are required for specific actions (normally in a service case).

NOTE The tables include both settings for modules – with on-board LAN and without on-board LAN. They are identified as LAN and no LAN.

Boot-Resident

Firmware update procedures may require this mode in case of firmware loading errors (main firmware part).

If you use the following switch settings and power the instrument up again, the instrument firmware stays in the resident mode. It is not operable as a module. It only uses basic functions of the operating system for example, for communication. In this mode the main firmware can be loaded (using update utilities).

Table 11 Boot Resident Settings (without on-board LAN)

	Mode Select	SW1	SW2	SW3	SW4	SW5	SW6	SW7	SW8
LAN	TEST/BOOT	1	1	1	0	0	0	0	0
No LAN	TEST/BOOT	1	1	0	0	1	0	0	0

Forced Cold Start

A forced cold start can be used to bring the module into a defined mode with default parameter settings.

CAUTION

Loss of data

Forced cold start erases all methods and data stored in the non-volatile memory. Exceptions are diagnosis and repair log books which will not be erased.

➔ Save your methods and data before executing a forced cold start.

If you use the following switch settings and power the instrument up again, a forced cold start has been completed.

Table 12 Forced Cold Start Settings (without on-board LAN)

	Mode Select	SW1	SW2	SW3	SW4	SW5	SW6	SW7	SW8
LAN	TEST/BOOT	1	1	0	0	0	0	0	1
No LAN	TEST/BOOT	1	1	0	0	1	0	0	1

2
Site Requirements and Specifications

Site Requirements 38
Physical Specifications 42
Performance Specifications 43
Specifications 45

This chapter gives information on environmental requirements, physical and performance specifications.

Site Requirements

A suitable environment is important to ensure optimal performance of the instrument.

Power Consideration

The detector power supply has wide ranging capabilities, see “Physical Specifications” on page 42. It accepts any line voltage in the above mentioned range. Consequently, there is no voltage selector in the rear of the detector. There are also no externally accessible fuses, because automatic electronic fuses are implemented in the power supply.

WARNING

Instrument is partially energized when switched off

The power supply still uses some power, even when the power switch on the front panel is turned OFF. Repair work at the detector can lead to personal injuries, e. g. shock hazard, when the detector cover is opened and the instrument is connected to power.

➔ To disconnect the detector from the power line, unplug the power cord.

WARNING

Hazard of electrical shock or damage of your instrumentation

can result, if the devices are connected to a line voltage higher than specified.

➔ Connect your instrument to the specified line voltage only.

CAUTION

Unaccessable power plug.

In case of emergency it must be possible to disconnect the instrument from the power line at any time.

➔ Make sure the power connector of the instrument can be easily reached and unplugged.

➔ Provide sufficient space behind the power socket of the instrument to unplug the cable.

Power Cords

Different power cords are offered as options with the module. The female end of all power cords is identical. It plugs into the power-input socket at the rear. The male end of each power cord is different and designed to match the wall socket of a particular country or region.

WARNING

Absence of ground connection or use of unspecified power cord

The absence of ground connection or the use of unspecified power cord can lead to electric shock or short circuit.

➔ Never operate your instrumentation from a power outlet that has no ground connection.

➔ Never use a power cord other than the Agilent Technologies power cord designed for your region.

WARNING

Use of unsupplied cables

Using cables not supplied by Agilent Technologies can lead to damage of the electronic components or personal injury.

➔ Never use cables other than the ones supplied by Agilent Technologies to ensure proper functionality and compliance with safety or EMC regulations.

WARNING

Unintended use of supplied power cords

Using power cords for unintended purposes can lead to personal injury or damage of electronic equipment.

➔ Never use the power cords that Agilent Technologies supplies with this instrument for any other equipment.

Bench Space

The detector dimensions and weight (see "Physical Specifications" on page 42) allows you to place the detector on almost any desk or laboratory bench. It needs an additional 2.5 cm (1.0 inch) of space on either side and approximately 8 cm (3.1 inch) in the rear for air circulation and electric connections.

If the bench should carry an Agilent 1200 Infinity Series system, make sure that the bench is designed to bear the weight of all modules.

The detector should be operated in a horizontal position.

Environment

Your detector will work within specifications at ambient temperatures and relative humidity as described in "Physical Specifications" on page 42.

ASTM drift tests require a temperature change below 2 °C/hour (3.6 °F/hour) measured over one hour period. Our published drift specification (refer also to "Performance Specifications" on page 43) is based on these conditions. Larger ambient temperature changes will result in larger drift.

Better drift performance depends on better control of the temperature fluctuations. To realize the highest performance, minimize the frequency and the amplitude of the temperature changes to below 1 °C/hour (1.8 °F/hour). Turbulences around one minute or less can be ignored.

CAUTION

Condensation within the module

Condensation will damage the system electronics.

➔ Do not store, ship or use your module under conditions where temperature fluctuations could cause condensation within the module.

➔ If your module was shipped in cold weather, leave it in its box and allow it to warm slowly to room temperature to avoid condensation.

Physical Specifications

Table 13 Physical Specifications

Type	Specification	Comments
Weight	11 kg (25 lbs)	
Dimensions (height × width × depth)	140 x 345 x 435 mm (5.5 x 13.5 x 17 inches)	
Line voltage	100 – 240 VAC, ± 10%	Wide-ranging capability
Line frequency	50 or 60 Hz, ± 5%	
Power consumption	220 VA, 85 W / 290 BTU	Maximum
Ambient operating temperature	0–55 °C (32–131 °F)	
Ambient non-operating temperature	-40–70 °C (-4–158 °F)	
Humidity	< 95%, at 25–40 °C (77–104 °F)	Non-condensing
Operating Altitude	Up to 2000 m (6562 ft)	
Non-operating altitude	Up to 4600 m (15091 ft)	For storing the module
Safety standards: IEC, CSA, UL	Installation Category II, Pollution Degree 2	For indoor use only.

Performance Specifications

Table 14 Performance Specifications

Type	Specification	Comments
Detection type	Double-beam photometer	
Light source	Deuterium lamp	
Wavelength range	190 – 600 nm	The UV-lamp is equipped with RFID tag that holds lamp typical information.
Short term noise	± $0.15 \cdot 10^{-5}$ AU at 230 nm (G1314E/D) ± $0.25 \cdot 10^{-5}$ AU at 230 nm (G1314F)	Under specified condtions. See "Specifications" on page 45 below the table.
Drift	< $1 \cdot 10^{-4}$ AU/h at 230 nm	Under specified condtions. See "Specifications" on page 45 below the table.
Linearity	> 2.5 AU (5 %) at 265 nm	Under specified condtions. See "Specifications" on page 45 below the table.
Wavelength accuracy	± 1 nm	Self-calibration with deuterium lines, verification with holmium oxide filter
Maximum sampling rate	20 Hz (G1314D) 80 Hz (G1314F) 160 Hz (G1314E)	
Band width	6.5 nm typical	
Flow cells	Standard: 14 µL volume, 10 mm cell path length and 40 bar (588 psi) pressure maximum High pressure: 14 µL volume, cell path length and 400 bar (5880 psi) pressure maximum Micro: 2 µL volume, 3 mm cell path length and 120 bar (1760 psi) pressure maximum Semi-micro: 5 µL volume, 6 mm cell path length and 40 bar (588 psi) pressure maximum	All flow cells have RFID tags for unambitious identification. Can be repaired on component level
Electronic Temperature Control (ETC)	For improved baseline stability in instable environment.	

Table 14 Performance Specifications

Type	Specification	Comments
Control and data evaluation	Agilent ChemStation B.04.02 SP2 or above (G1314F) Agilent ChemStation B.03.02 SR1 or above (G1314E/D) Instant Pilot (G4208A) with firmware B.02.11 or above (G1314F) Instant Pilot (G4208A) with firmware B.02.07 or above (G1314E/D)	Control and data evaluation Control only
Time programmable	Wavelength, Reference and Sample scan, balance, steps,lamp on/off	
Spectral tools	Stop-flow wavelength scan	
Analog outputs	Recorder/integrator: 100 mV or 1 V, output range 0.001 – 2 AU, one output	
Communications	LAN card integrated on main board, Controller-area network (CAN), RS-232C, APG Remote: ready, start, stop and shut-down signals	
Safety and maintenance	Extensive diagnostics, error detection and display (through Instant Pilot and Data System), leak detection, safe leak handling, leak output signal for shutdown of pumping system. Low voltages in major maintenance areas.	
GLP features	Early maintenance feedback (EMF) for continuous tracking of instrument usage in terms of lamp burn time with user-settable limits and feedback messages. Electronic records of maintenance and errors. Verification of wavelength accuracy with built-in holmium oxide filter. RFID for electronics records of flow cell and UV lamp conditions (path length, volume, product number, serial number, test passed, usage)	
Housing	All materials recyclable.	

Specifications

ASTM: “Standard Practice for Variable Wavelength Photometric Detectors Used in Liquid Chromatography”.

Reference conditions: Standard flow cell, path length 10 mm, flow 1 mL/min LC-grade methanol.

Noise:

± $0.15 \cdot 10^{-5}$ AU (G1314E/D), ± $0.25 \cdot 10^{-5}$ AU (G1314F) at 230 nm, TC 2 s

RT = 2.2 * TC

Linearity:

Linearity is measured with caffeine at 265 nm.

NOTE The specification are based on the the standard RFID tag lamp (G1314-60101) and may be not achieved when other lamp types or aged lamps are used.

ASTM drift tests require a temperature change below 2°C/hour (3.6°F/hour) over one hour period. Our published drift specification is based on these conditions. Larger ambient temperature changes will result in larger drift.

Better drift performance depends on better control of the temperature fluctuations. To realize the highest performance, minimize the frequency and the amplitude of the temperature changes to below 1°C/hour (1.8°F/hour). Turbulences around one minute or less can be ignored.

Performance tests should be done with a completely warmed up optical unit (> one hour). ASTM measurements require that the detector should be turned on at least 24 hours before start of testing.

3
Installing the Detector

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- Detector Accessory Kit Contents 49

Optimizing the Stack Configuration 50
- One Stack Configuration 51
- Two Stack Configuration 55

Installing the Detector 59

Flow Connections to the Detector 62

This chapter describes the installation of the detector.

Unpacking the Detector

CAUTION

Condensation within the detector

Condensation will damage the system electronics.

➔ Do not store, ship or use your detector under conditions where temperature fluctuations could cause condensation within the detector.

➔ If your detector was shipped in cold weather, leave it in its box and allow it to warm up slowly to room temperature to avoid condensation.

Damaged Packaging

If the delivery packaging shows signs of external damage, please call your Agilent Technologies sales and service office immediately. Inform your service representative that the instrument may have been damaged during shipment.

CAUTION

"Defective on arrival" problems

If there are signs of damage, please do not attempt to install the module. Inspection by Agilent is required to evaluate if the instrument is in good condition or damaged.

➔ Notify your Agilent sales and service office about the damage.

➔ An Agilent service representative will inspect the instrument at your site and initiate appropriate actions.

Delivery Checklist

Ensure all parts and materials have been delivered with the detector. The delivery checklist is shown below. Please report missing or damaged parts to your local Agilent Technologies sales and service office.

Table 15 Variable Wavelength Detector Checklist

Description	Quantity
Variable wavelength detector	1
Power cable	1
Flow cell	As ordered
User Manual on Documentation CD (part of the shipment - not module specific)	1
Accessory kit	1
CompactFlash Card (G1314E)	1

Detector Accessory Kit Contents

The G1314E/F VWD is shipped with Accessory kit (p/n G1314-68755) (see "Accessory Kit" on page 197).

Optimizing the Stack Configuration

If your detector is part of a complete Agilent 1200 Infinity Series system, you can ensure optimum performance by installing the following configuration. This configuration optimizes the system flow path, ensuring minimum delay volume.

One Stack Configuration

One Stack Configuration for Agilent 1260 Infinity LC

Ensure optimum performance by installing the modules of the Agilent 1260 Infinity LC System in the following configuration (See Figure 8 on page 51 and Figure 9 on page 52). This configuration optimizes the flow path for minimum delay volume and minimizes the bench space required.

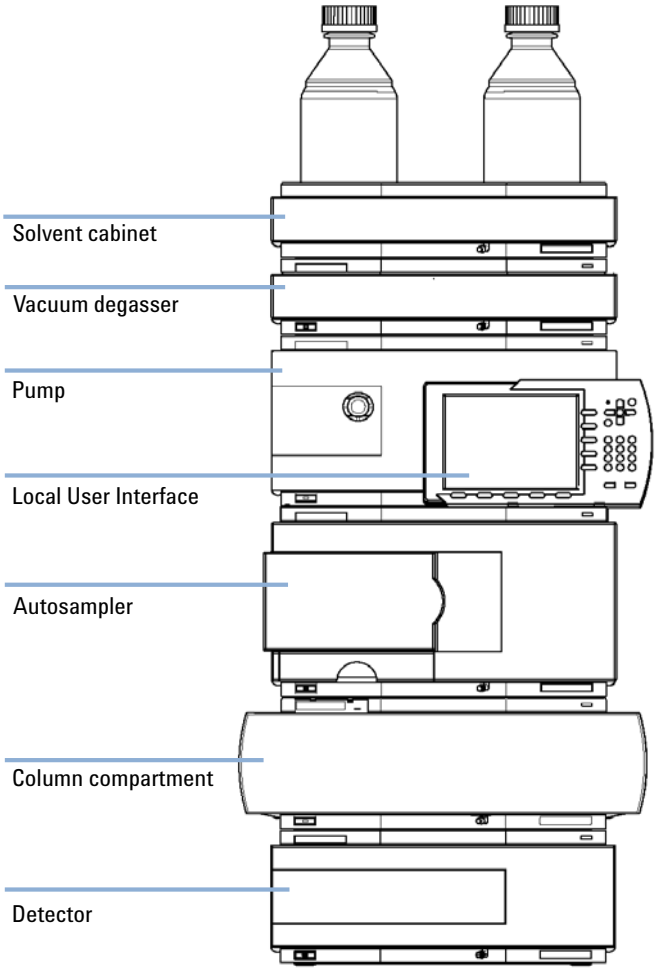


Figure 8 Recommended Stack Configuration for 1260 (Front View)

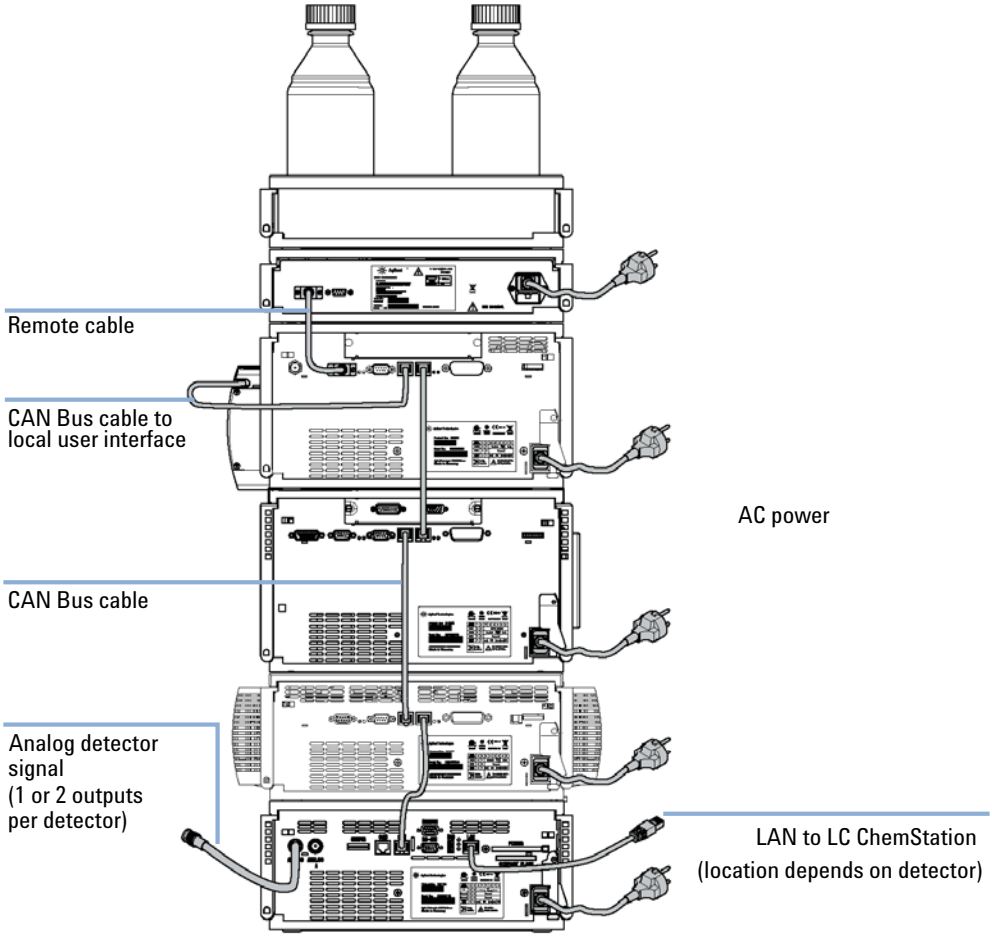

Remote cable
CAN Bus cable to local user interface
CAN Bus cable
Analog detector signal (1 or 2 outputs per detector)
AC power
LAN to LC ChemStation (location depends on detector)

Figure 9 Recommended Stack Configuration for 1260 (Rear View)

One Stack Configuration for Agilent 1290 Infinity LC

Ensure optimum performance by installing the modules of the Agilent 1290 Infinity LC System in the following configuration (See Figure 10 on page 53 and Figure 11 on page 54). This configuration optimizes the flow path for minimum delay volume and minimizes the bench space required.

The Agilent 1290 Infinity Binary Pump should always be installed at the bottom of the stack.

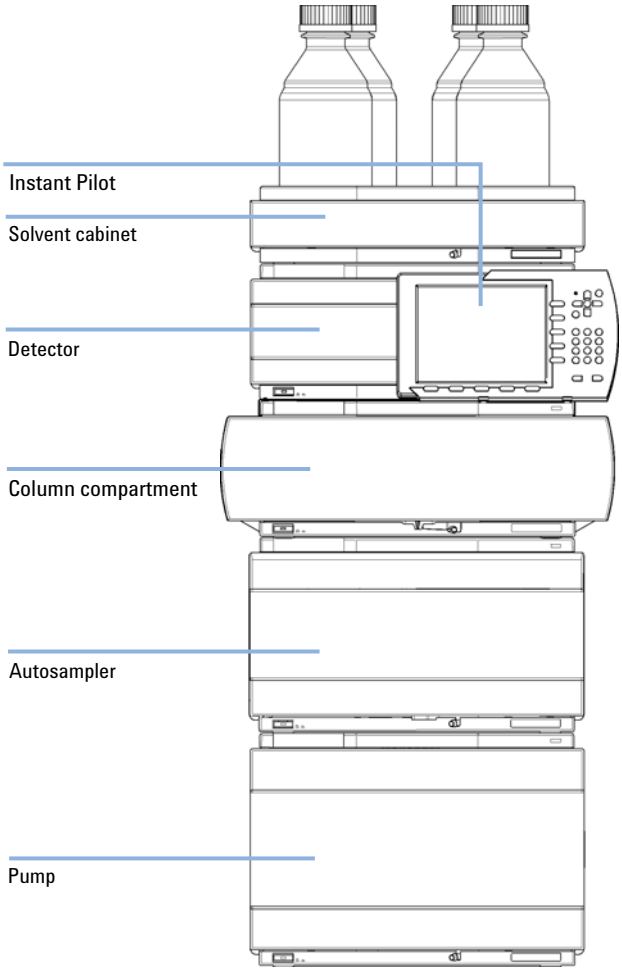


Figure 10 Recommended Stack Configuration for 1290 (Front View)

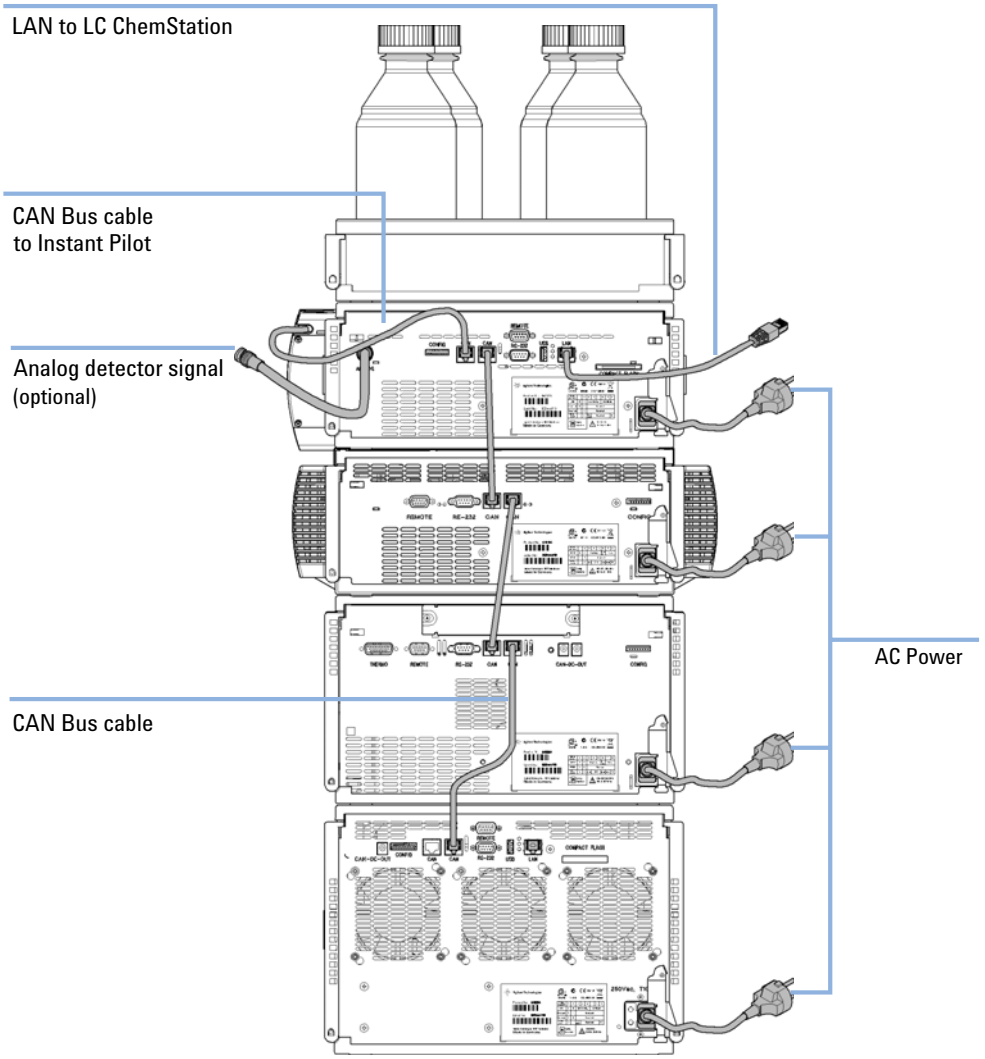


Figure 11 Recommended Stack Configuration 1290 (Rear View)

Two Stack Configuration

Two Stack Configuration for Agilent 1260 Infinity LC

To avoid excessive height of the stack when the autosampler thermostat is added to the system it is recommended to form two stacks. Some users prefer the lower height of this arrangement even without the autosampler thermostat. A slightly longer capillary is required between the pump and autosampler. (See Figure 12 on page 55 and Figure 13 on page 56).

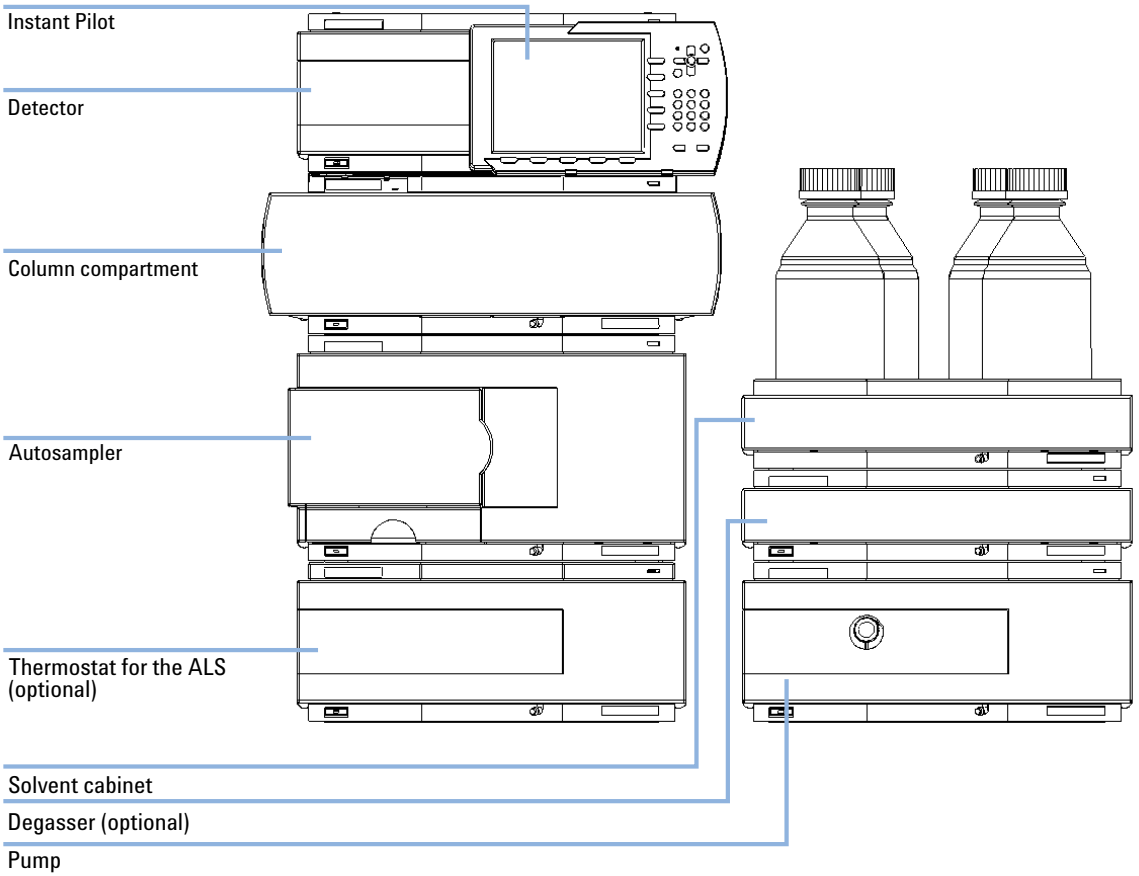


Figure 12 Recommended Two Stack Configuration for 1260 (Front View)

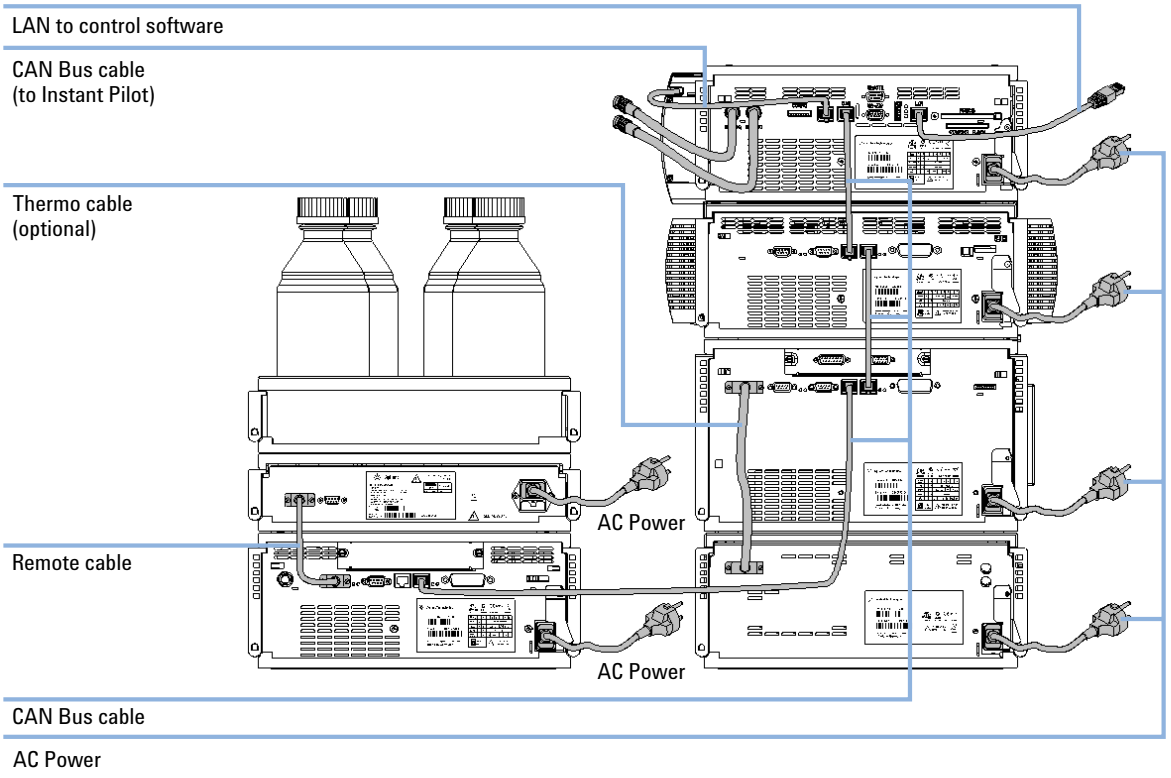


Figure 13 Recommended Two Stack Configuration for 1260 (Rear View)

Two Stack Configuration for Agilent 1290 Infinity LC

To avoid excessive height of the stack when the autosampler thermostat is added to the system it is recommended to form two stacks. Some users prefer the lower height of this arrangement even without the autosampler thermostat. A slightly longer capillary is required between the pump and autosampler. (See Figure 14 on page 57 and Figure 15 on page 58).

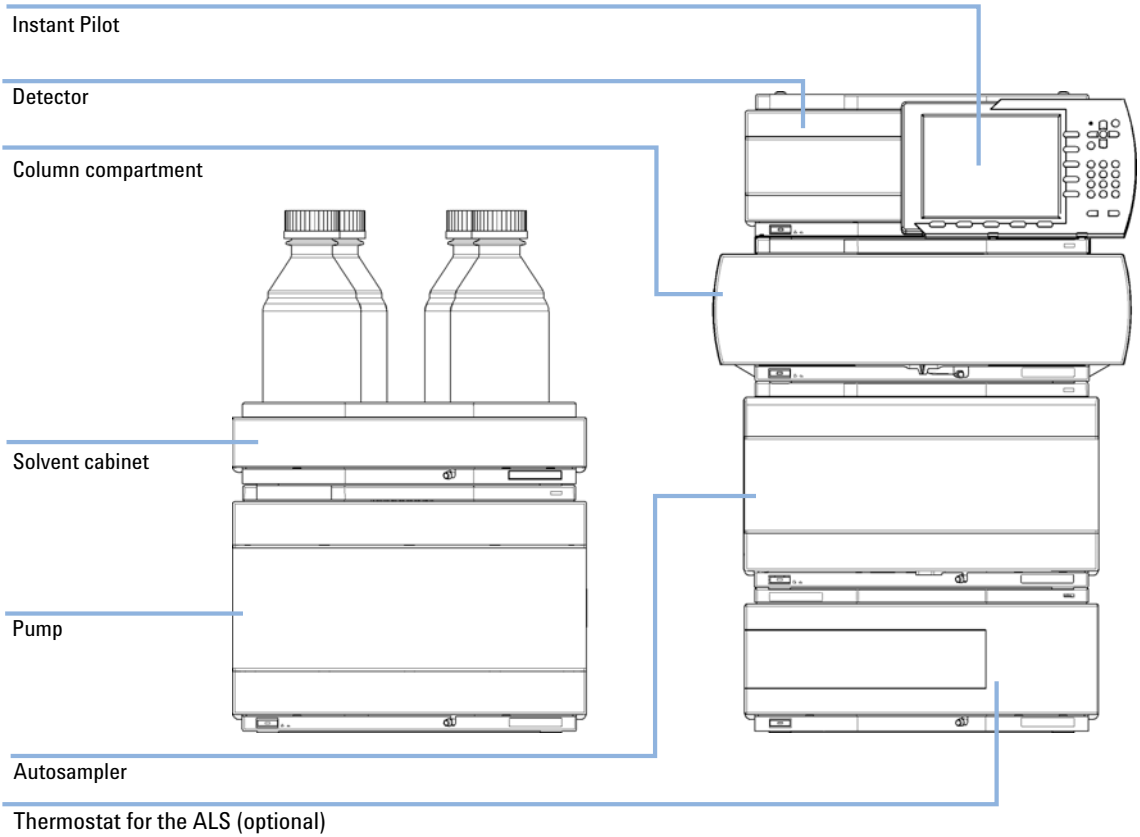


Figure 14 Recommended Two Stack Configuration for 1290 (Front View)

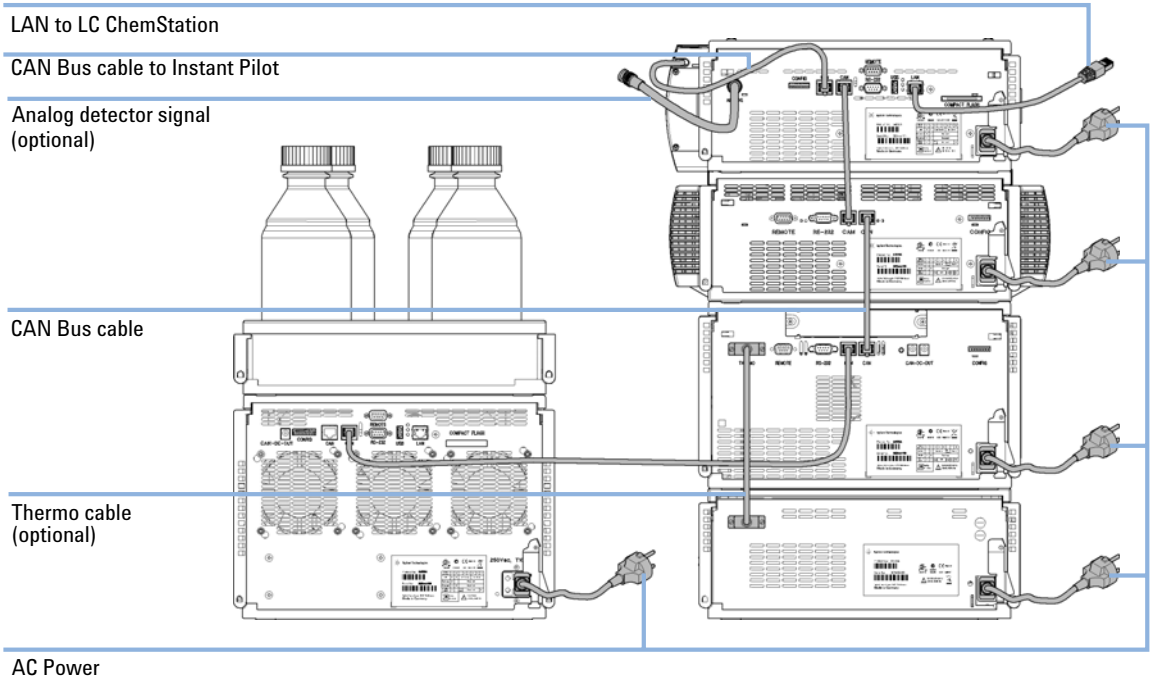


Figure 15 Recommended Two Stack Configuration for 1290 (Rear View)

Installing the Detector

Parts required

#	p/n	Description
1		Detector
1		Power cord
1		LAN cable (cross-over or twisted pair network cable)
1		Agilent ChemStation or other control software
1	G4208A	Instant Pilot
1		CompactFlash Card (G1314E only)

For other cables see below and section "Cable Overview" on page 200.

Instant Pilot (G4208A) is optional.

Preparations

Other LC modules must have appropriate firmware installed to work with the detector.

Locate bench space

Provide power connections

Unpack the detector

NOTE Before adding the detector into an existing system assure that the existing modules have been updated to firmware revision A.06.30/B.06.30 (G1314F), A.06.10/B.06.10 (G1314E/D) has the appropriate software revision that supports the detector.

NOTE If you want to use the "data-never-lost" feature, then assure that the CompactFlash Card is installed in the rear of the G1314E VWD.

1 Note the MAC address of the LAN interface (rear of the module, under the configuration switch, see figure below). It's required for LAN Configuration, see chapter *LAN Configuration*.

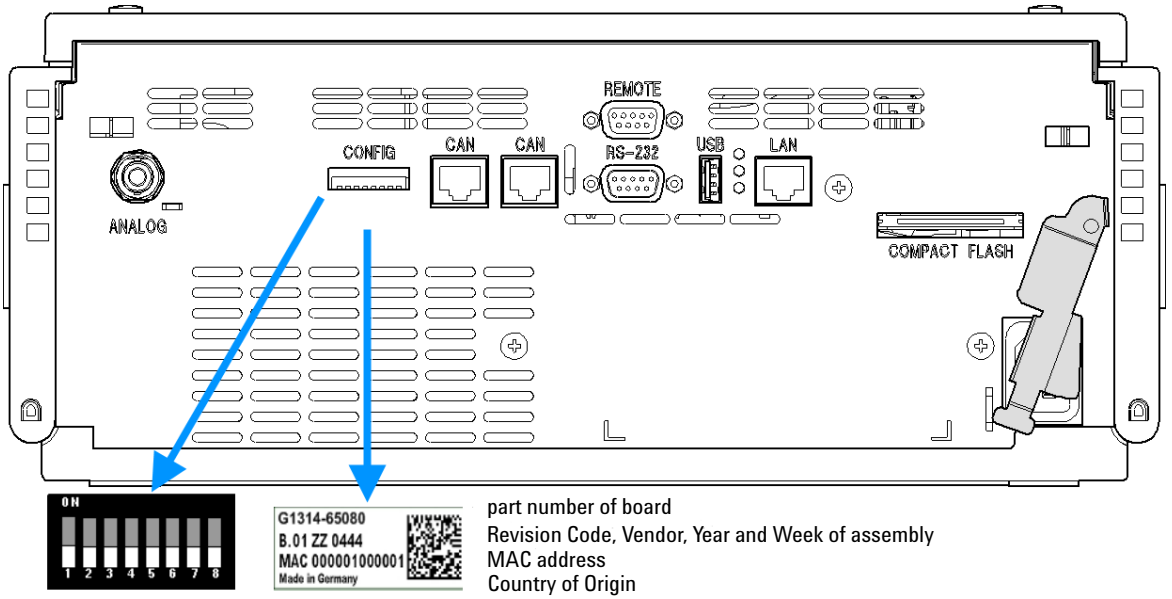


Figure 16 Rear View of Detector

2 Check the setting of the DIP switch at the rear of the detector. All switches should be in down position (BOOTP mode). If another boot mode is required refer to "Link configuration selection" on page 73.

NOTE The detector was shipped with default configuration settings (all switches down).

3 Place the detector in the stack or on the bench in a horizontal position.

4 Ensure the line power switch at the front of the detector is OFF.

5 Connect the power cable to the power connector at the rear of the detector.

6 Connect the CAN cable to other modules.

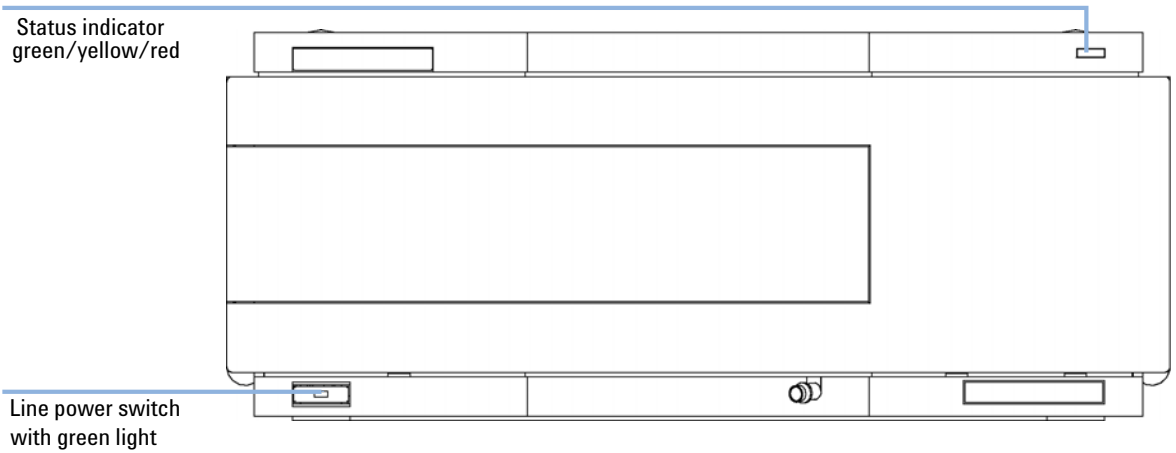
7 Connect the LAN cable (e.g. from a Agilent ChemStation as controller) to the detector's LAN connector.

NOTE In multi-detector configurations the LAN of the Agilent detector with the highest data rate must be used due to its higher data load.

8 Connect the analog cable(s) (optional).

9 Connect the APG remote cable (optional) for non-Agilent 1200 Infinity Series instruments.

10 Turn on power by pushing the button at the lower left hand side of the detector. The status LED should be green.



NOTE The detector is turned on when the line power switch is pressed and the green indicator lamp is illuminated. The detector is turned off when the line power switch is protruding and the green light is off.

NOTE To disconnect the detector from line, unplug the power cord. The power supply still uses some power, even if the power switch at the front panel is turned off.

Flow Connections to the Detector

Tools required Two wrenches 1/4 – 5/16 inch for capillary connections

Parts required

#	p/n	Description
1	G1314-68755	Accessory kit

Hardware required Other modules depend on system setup

Preparations Detector is installed in the LC system.

WARNING

Toxic, flammable and hazardous solvents, samples and reagents

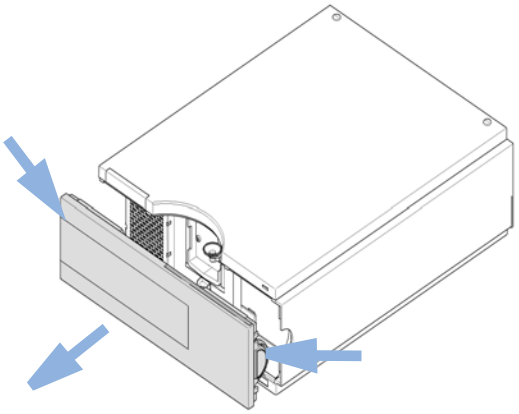
The handling of solvents, samples and reagents can hold health and safety risks.

- ➔ When working with these substances observe appropriate safety procedures (for example by wearing goggles, safety gloves and protective clothing) as described in the material handling and safety data sheet supplied by the vendor and follow good laboratory practice.
- ➔ The amount of substances should be reduced to the minimal volume required for the analysis.
- ➔ Do not operate the instrument in an explosive atmosphere.

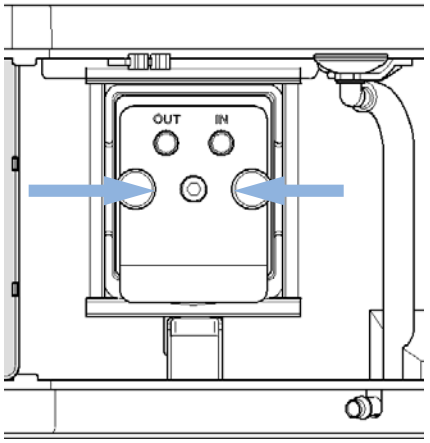
NOTE

The flow cell is shipped with a filling of isopropanol (also recommended when the instrument and/or flow cell is shipped to another location). This is to avoid breakage due to subambient conditions.

1 Press the release buttons and remove the front cover to have access to the front area.

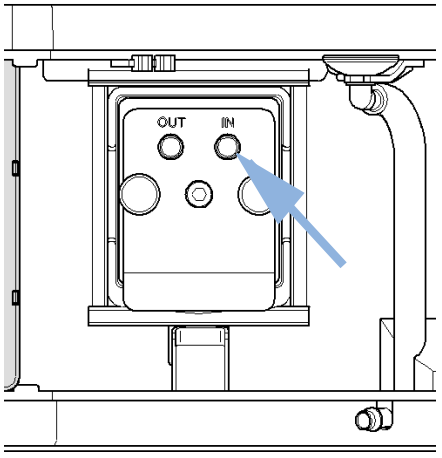


2 Remove the metal cover and install the flow cell. Press the flow cell completely into the slot and tighten the cell screws (both parallel) until the mechanical stop.



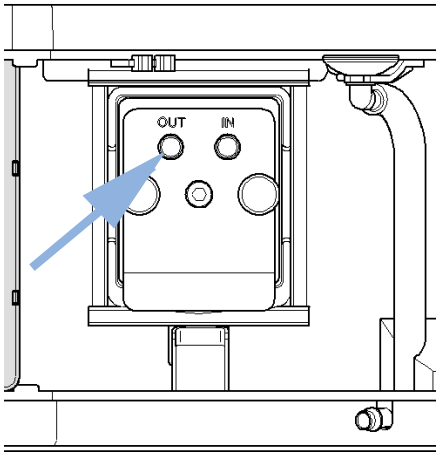
3 Assemble the column-detector capillary. Depending on the flow cell type it may be a PEEK or SST capillary.

4 Connect the newly assembled fitting of the capillary to the inlet connector.

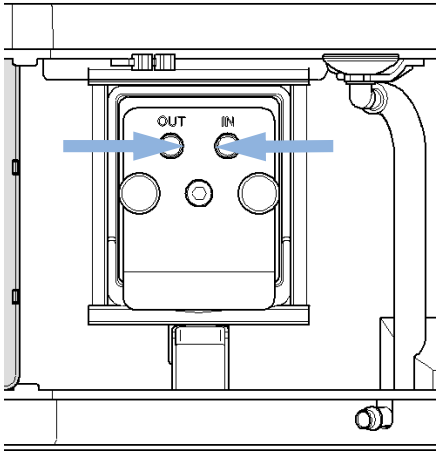


5 Connect the other end of the capillary to the column.

6 Connect the PEEK waste capillary to the outlet connector.



7 Establish a flow and observe for leakage.



8 Replace the front cover.

The installation of the detector is now complete.

NOTE The detector should be operated with the front cover in place to protect the flow cell area against strong drafts from the outside.

4
LAN Configuration

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This chapter provides information on connecting the detector to the Agilent ChemStation PC.

What you have to do first

The module has an on-board LAN communication interface.

1 Note the MAC (Media Access Control) address for further reference. The MAC or hardware address of the LAN interfaces is a world wide unique identifier. No other network device will have the same hardware address. The MAC address can be found on a label at the rear of the module underneath the configuration switch.

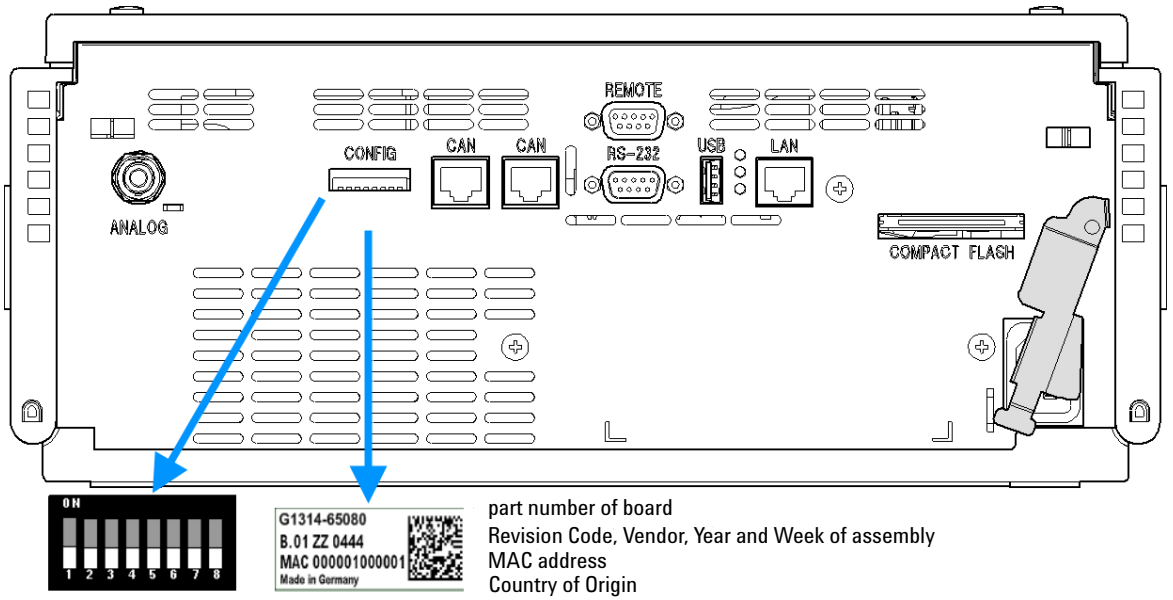

Figure 17 Location of Configuration Switch and MAC Label

2 Connect the instrument's LAN interface to

- the PC network card using a crossover network cable (point-to-point) or
- a hub or switch using a standard LAN cable.

TCP-IP parameter configuration

To operate properly in a network environment, the LAN interface must be configured with valid TCP/IP network parameters. These parameters are:

- IP address
- Subnet Mask
- Default Gateway

The TCP/IP parameters can be configured by the following methods:

- by automatically requesting the parameters from a network-based BOOTP Server (using the so-called Bootstrap Protocol)
- by manually setting the parameters using Telnet
- by manually setting the parameters using the Instant Pilot (G4208A)

The LAN interface differentiates between several initialization modes. The initialization mode (short form ‘init mode’) defines how to determine the active TCP/IP parameters after power-on. The parameters may be derived from a Bootp cycle, non-volatile memory or initialized with known default values. The initialization mode is selected by the configuration switch, see Table 19 on page 73.

Configuration Switches

The configuration switch can be accessed at the rear of the module, see figure below.

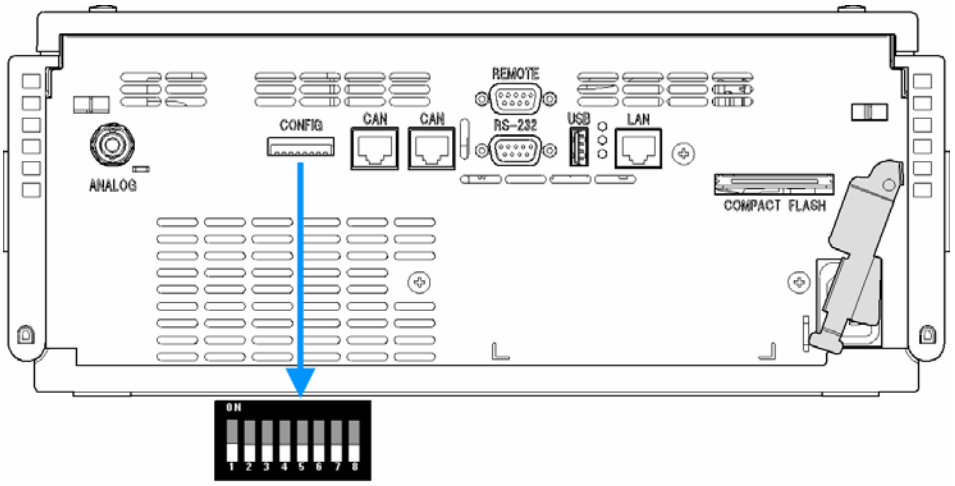

Figure 18 Location of Configuration Switch

The module is shipped with all switches set to OFF, as shown above.

NOTE To perform any LAN configuration, SW1 and SW2 must be set to OFF.

Table 16 Factory Default Settings

Initialization ('Init') Mode	Bootp, all switches down. For details see Figure 19 on page 69
Link Configuration	speed and duplex mode determined by auto-negotiation, for details see "Link configuration selection" on page 73

Initialization mode selection

The following initialization (init) modes are selectable:

Table 17 Initialization Mode Switches

	SW 6	SW 7	SW 8	Init Mode
	OFF	OFF	OFF	Bootp
	OFF	OFF	ON	Bootp & Store
	OFF	ON	OFF	Using Stored
	OFF	ON	ON	Using Default

Bootp

When the initialization mode **Bootp** is selected, the module tries to download the parameters from a **Bootp** Server. The parameters obtained become the active parameters immediately. They are not stored to the non-volatile memory of the module. Therefore, the parameters are lost with the next power cycle of the module.

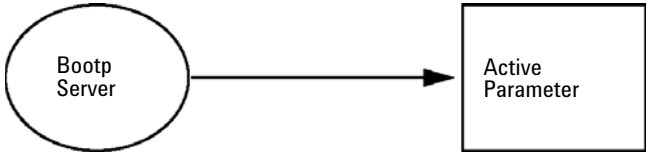

Figure 19 Bootp (Principle)

Bootp & Store

When **Bootp & Store** is selected, the parameters obtained from a **Bootp** Server become the active parameters immediately. In addition, they are stored to the non-volatile memory of the module. Thus, after a power cycle they are still available. This enables a kind of bootp once configuration of the module.

Example: The user may not want to have a **Bootp** Server be active in his network all the time. But on the other side, he may not have any other configuration method than **Bootp**. In this case he starts the **Bootp** Server temporarily, powers on the module using the initialization mode **Bootp & Store**, waits for the **Bootp** cycle to be completed, closes the **Bootp** Server and powers off the module. Then he selects the initialization mode Using Stored and powers on the module again. From now on, he is able to establish the TCP/IP connection to the module with the parameters obtained in that single **Bootp** cycle.

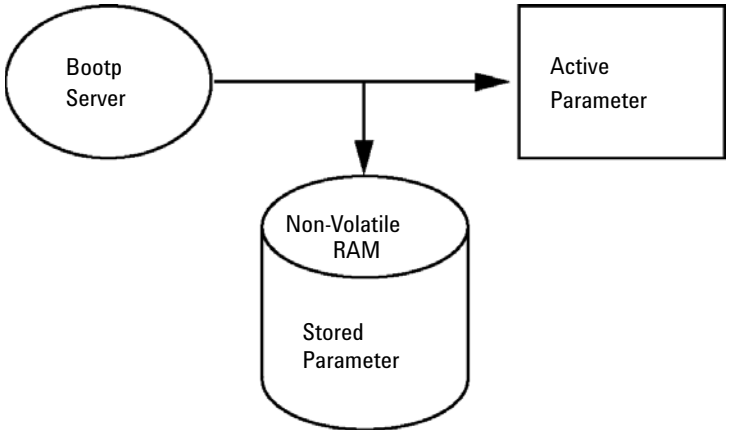

Figure 20 Bootp & Store (Principle)

NOTE Use the initialization mode **Bootp & Store** carefully, because writing to the non-volatile memory takes time. Therefore, when the module shall obtain its parameters from a **Bootp** Server every time it is powered on, the recommended initialization mode is **Bootp**!

Using Stored

When initialization mode **Using Stored** is selected, the parameters are taken from the non-volatile memory of the module. The TCP/IP connection will be established using these parameters. The parameters were configured previously by one of the described methods.

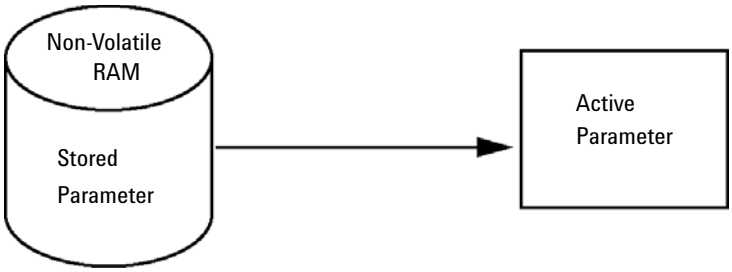

Figure 21 Using Stored (Principle)

Using Default

When **Using Default** is selected, the factory default parameters are taken instead. These parameters enable a TCP/IP connection to the LAN interface without further configuration, see Table 18 on page 71.

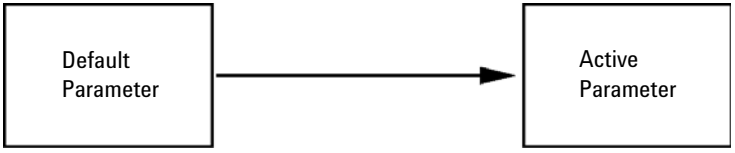

Figure 22 Using Default (Principle)

NOTE Using the default address in your local area network may result in network problems. Take care and change it to a valid address immediately.

Table 18 Using Default Parameters

IP address:	192.168.254.11
Subnet Mask:	255.255.255.0
Default Gateway	not specified

Since the default IP address is a so-called local address, it will not be routed by any network device. Thus, the PC and the module must reside in the same subnet.

The user may open a Telnet session using the default IP address and change the parameters stored in the non-volatile memory of the module. He may then close the session, select the initialization mode Using Stored, power-on again and establish the TCP/IP connection using the new parameters.

When the module is wired to the PC directly (e.g. using a cross-over cable or a local hub), separated from the local area network, the user may simply keep the default parameters to establish the TCP/IP connection.

NOTE

In the **Using Default** mode, the parameters stored in the memory of the module are not cleared automatically. If not changed by the user, they are still available, when switching back to the mode Using Stored.

Link configuration selection

The LAN interface supports 10 or 100 Mbps operation in full- or half-duplex modes. In most cases, full-duplex is supported when the connecting network device - such as a network switch or hub - supports IEEE 802.3u auto-negotiation specifications.

When connecting to network devices that do not support auto-negotiation, the LAN interface will configure itself for 10- or 100-Mbps half-duplex operation.

For example, when connected to a non-negotiating 10-Mbps hub, the LAN interface will be automatically set to operate at 10-Mbps half-duplex.

If the module is not able to connect to the network through auto-negotiation, you can manually set the link operating mode using link configuration switches on the module.

Table 19 Link Configuration Switches

	SW 3	SW 4	SW 5	Link Configuration
	OFF	-	-	speed and duplex mode determined by auto-negotiation
	ON	OFF	OFF	manually set to 10 Mbps, half-duplex
	ON	OFF	ON	manually set to 10 Mbps, full-duplex
	ON	ON	OFF	manually set to 100 Mbps, half-duplex
	ON	ON	ON	manually set to 100 Mbps, full-duplex

Automatic configuration with Bootp

NOTE All examples shown in this chapter will not work in your environment. You need your own IP-, Subnet-Mask- and Gateway addresses.

NOTE Assure that the detector configuration switch is set properly. The setting should be either **BootP** or **BootP & Store**, see Table 17 on page 69.

NOTE Assure that the detector connected to the network is powered off.

NOTE If the Agilent BootP Service program is not already installed on your PC, then install it from your Agilent ChemStation DVD, located in folder **BootP**.

About Agilent BootP Service

The Agilent BootP Service is used to assign the LAN Interface with an IP address.

The Agilent BootP Service is provided on the ChemStation DVD. The Agilent BootP Service is installed on a server or PC on the LAN to provide central administration of IP addresses for Agilent instruments on a LAN. The BootP service must be running TCP/IP network protocol and cannot run a DHCP server.

How BootP Service Works

When an instrument is powered on, an LAN Interface in the instrument broadcasts a request for an IP address or host name and provides its hardware MAC address as an identifier. The Agilent BootP Service answers this request and passes a previously defined IP address and host name associated with the hardware MAC address to the requesting instrument.

The instrument receives its IP address and host name and maintains the IP address as long as it is powered on. Powering down the instrument causes it to lose its IP address, so the Agilent BootP Service must be running every time the instrument powers up. If the Agilent BootP Service runs in the background, the instrument will receive its IP address on power-up.

The Agilent LAN Interface can be set to store the IP address and will not lose the IP address if power cycled.

Situation: Cannot Establish LAN Communication

If a LAN communication with BootP service cannot be established, check the following on the PC:

- Is the BootP service started? During installation of BootP, the service is not started automatically.
- Does the Firewall block the BootP service? Add the BootP service as an exception.
- Is the LAN Interface using the BootP-mode instead of "Using Stored" or "Using Default" modes?

Installation of BootP Service

Before installing and configuring the Agilent BootP Service, be sure to have the IP addresses of the computer and instruments on hand.

1 Log on as Administrator or other user with Administrator privileges.

2 Close all Windows programs.

3 Insert the Agilent ChemStation software DVD into the drive. If the setup program starts automatically, click **Cancel** to stop it.

4 Open Windows Explorer.

5 Go to the BootP directory on the Agilent ChemStation DVD and double-click **BootPPackage.msi**.

6 If necessary, click the **Agilent BootP Service...** icon in the task bar.

7 The **Welcome** screen of the **Agilent BootP Service Setup Wizard** appears. Click **Next**.

8 The **End-User License Agreement** screen appears. Read the terms, indicate acceptance, then click **Next**.

9 The **Destination Folder** selection screen appears. Install BootP to the default folder or click **Browse** to choose another location. Click **Next**.

The default location for installation is:

C:\Program Files\Agilent\BootPService\

10 Click **Install** to begin installation.

11 Files load; when finished, the **BootP Settings** screen appears.

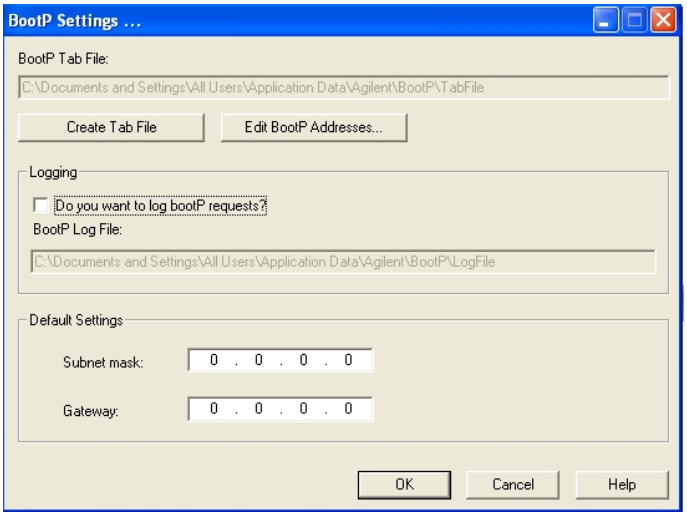

Figure 23 BootP Settings screen

12 In the **Default Settings** part of the screen, if known, you can enter the subnet mask and gateway.

Defaults can be used:

- The default subnet mask is 255.255.255.0.
- The default gateway is 10.1.1.101.

13 On the **BootP Settings** screen, click **OK**. The **Agilent BootP Service Setup** screen indicates completion.

14 Click **Finish** to exit the **Agilent BootP Service Setup** screen.

15 Remove the DVD from the drive.

This completes installation.

16 Start the BootP service. On the Windows® desktop, select **Start > Control Panel > Services**. Select the **Agilent BootP Service** and click **Start**.

Two Methods to Determine the MAC Address

Enabling logging to discover the MAC address using BootP

If you want to see the MAC address, select the **Do you want to log BootP requests?** check box.

1 Open BootP Settings from **Start > All Programs > Agilent BootP Service > EditBootPSettings**.

2 In **BootP Settings...** check **Do you want to log BootP requests?** to enable logging.

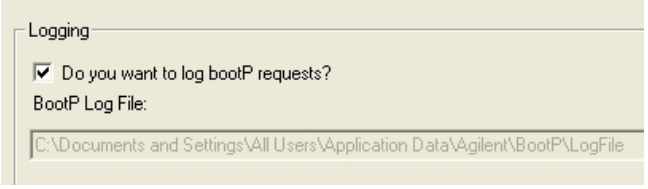
Logging
Do you want to log bootP requests?
BootP Log File:
C:\Documents and Settings\All Users\Application Data\Agilent\BootP\LogFile

Figure 24 Enable BootP logging

The log file is located in

C:\Documents and Settings\All Users\Application Data\Agilent\BootP\LogFile

It contains a MAC address entry for each device that requests configuration information from BootP.

3 Click **OK** to save the values or **Cancel** to discard them. The editing ends.

4 After each modification of the BootP settings (i.e. **EditBootPSettings**) a stop or start of the BootP service is required for the BootP service to accept changes. See "Stopping the Agilent BootP Service" on page 82 or "Restarting the Agilent BootP Service" on page 83.

5 Uncheck the **Do you want to log BootP requests?** box after configuring instruments; otherwise, the log file will quickly fill up disk space.

Determining the MAC address directly from the LAN Interface card label

1 Turn off the instrument.

2 Read the MAC address from the label and record it.

The MAC address is printed on a label on the rear of the module. It is the number below the barcode and after the colon (:) and usually begins with the letters AD, see Figure 17 on page 66 .

3 Turn on the instrument.

Assigning IP Addresses Using the Agilent BootP Service

The Agilent BootP Service assigns the Hardware MAC address of the instrument to an IP address.

Determining the MAC address of the instrument using BootP Service

1 Power cycle the Instrument.

2 After the instrument completes self-test, open the log file of the BootP Service using Notepad.

- The default location for the logfile is C:\Documents and Settings\All Users\Application Data\Agilent\BootP\LogFile.
- The logfile will not be updated if it is open.

The contents will be similar to the following:

```
02/25/10 15:30:49 PM

Status: BootP Request received at outermost layer

Status: BootP Request received from hardware address: 0010835675AC

Error: Hardware address not found in BootPTAB: 0010835675AC

Status: BootP Request finished processing at outermost layer
```

3 Record the hardware (MAC) address (for example, 0010835675AC).

4 The Error means the MAC address has not been assigned an IP address and the Tab File does not have this entry. The MAC address is saved to the Tab File when an IP address is assigned.

5 Close the log file before turning on another instrument.

6 Uncheck the **Do you want to log BootP requests?** box after configuring instruments to avoid having the logfile use up excessive disk space.

Adding each instrument to the network using BootP

1 Follow **Start > All Programs > Agilent BootP Service** and select **Edit BootP Settings**. The BootP Settings screen appears.

2 Uncheck the **Do you want to log BootP requests?** once all instruments have been added.

The **Do you want to log BootP requests?** box must be unchecked when you have finished configuring instruments; otherwise, the log file will quickly fill up disk space.

3 Click **Edit BootP Addresses...** The **Edit BootP Addresses** screen appears.

4 Click **Add...** The **Add BootP Entry** screen appears.

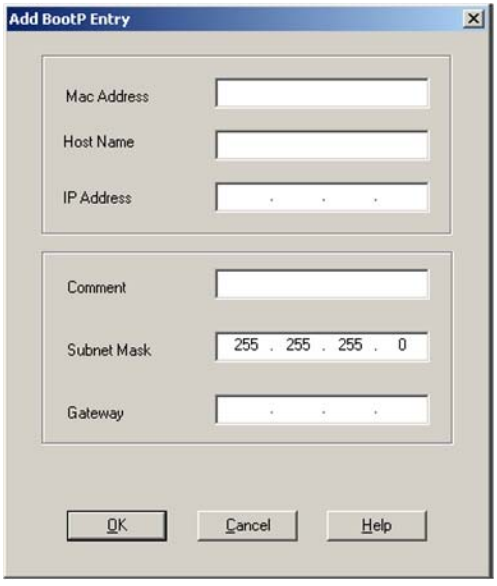

Figure 25 Enable BootP logging

5 Make these entries for the instrument:

- MAC address
- Host name, Enter a Hostname of your choice.

  The Host Name must begin with "alpha" characters (i.e. LC1260)
- IP address
- Comment (optional)

- Subnet mask
- Gateway address (optional)

The configuration information entered is saved in the Tab File.

6 Click **OK**.

7 Leave **Edit BootP Addresses** by pressing **Close**.

8 Exit **BootP Settings** by pressing **OK**.

9 After each modification of the BootP settings (i.e. EditBootPSettings) a stop or start of the BootP service is required for the BootP service to accept changes. See "Stopping the Agilent BootP Service" on page 82 or "Restarting the Agilent BootP Service" on page 83.

10 Power cycle the Instrument.

OR

If you changed the IP address, power cycle the instrument for the changes to take effect.

11 Use the PING utility to verify connectivity by opening a command window and typing:

Ping 10.1.1.101 for example.

The Tab File is located at

C:\Documents and Settings\All Users\Application Data\Agilent\BootP\TabFile

Changing the IP Address of an Instrument Using the Agilent BootP Service

Agilent BootP Service starts automatically when your PC reboots. To change Agilent BootP Service settings, you must stop the service, make the changes, and then restart the service.

Stopping the Agilent BootP Service

1 From the Windows control panel, select **Administrative Tools > Services**. The **Services** screen appears.

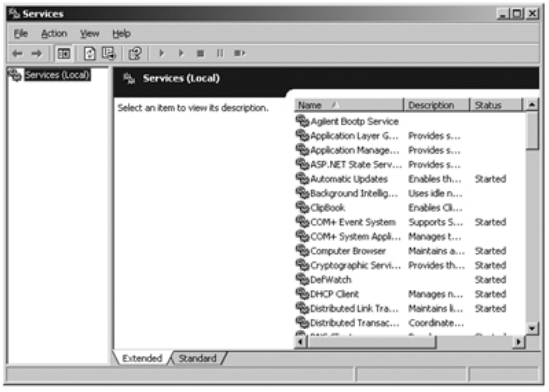

Figure 26 Windows Services screen

2 Right-click **Agilent BootP Service**.

3 Select **Stop**.

4 Close the **Services and Administrative Tools** screen.

Editing the IP address and other parameters in EditBootPSettings

1 Select **Start > All Programs > Agilent BootP Service** and select **Edit BootP Settings**. The **BootP Settings** screen appears.

2 When the **BootP Settings** screen is first opened, it shows the default settings from installation.

3 Press **Edit BootP Addresses...** to edit the Tab File.

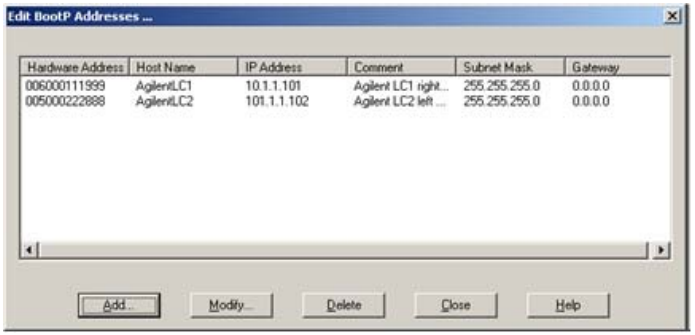

Figure 27 Edit BootP Adresses screen

4 In the **Edit BootP Addresses...** screen press **Add...** to create a new entry or select an existing line from the table and press **Modify...** or **Delete** to change the IP address, comment, subnet mask, for example, in the Tab File.

If you change the IP address, it will be necessary to power cycle the instrument for the changes to take effect.

5 Leave **Edit BootP Addresses...** by pressing **Close**.

6 Exit BootP Settings by pressing OK.

Restarting the Agilent BootP Service

1 In the Windows control panel, select **Administrative Tools > Services**. The **Services** screen appears, see Figure 26 on page 82.

2 Right-click **Agilent BootP Service** and select **Start**.

3 Close the **Services and Administrative Tools** screens.

Manual Configuration

Manual configuration only alters the set of parameters stored in the non-volatile memory of the module. It never affects the currently active parameters. Therefore, manual configuration can be done at any time. A power cycle is mandatory to make the stored parameters become the active parameters, given that the initialization mode selection switches are allowing it.

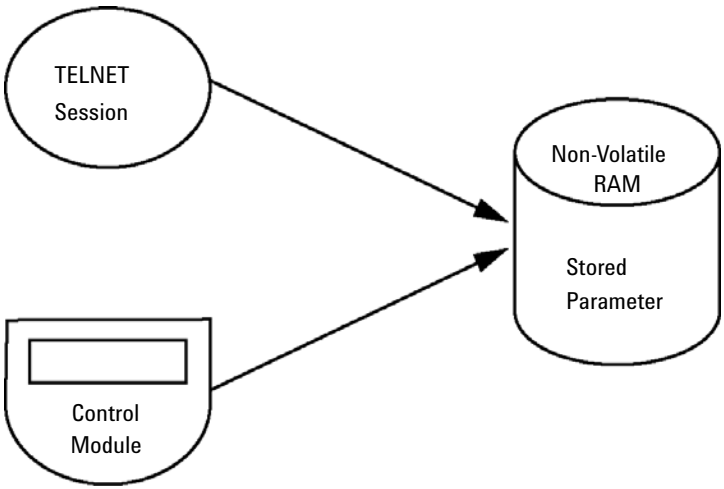

Figure 28 Manual Configuration (Principle)

With Telnet

Whenever a TCP/IP connection to the module is possible (TCP/IP parameters set by any method), the parameters may be altered by opening a Telnet session.

1 Open the system (DOS) prompt window by clicking on Windows **START** button and select **"Run..."**. Type "cmd" and press OK.

2 Type the following at the system (DOS) prompt:

- **c:\>telnet <IP address>** or
- **c:\>telnet <host name>**

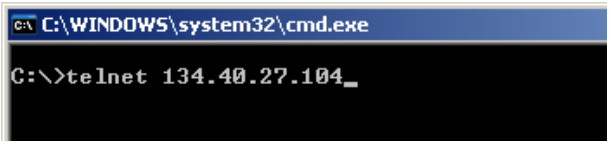

Figure 29 Telnet - Starting a session

where <IP address> may be the assigned address from a Bootp cycle, a configuration session with the Local Controller, or the default IP address (see "Configuration Switches" on page 68).

When the connection was established successfully, the module responds with the following:

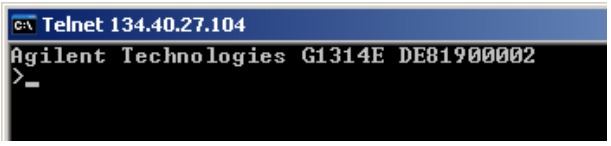

Figure 30 A connection to the module is made

3 Type ? and press enter to see the available commands.

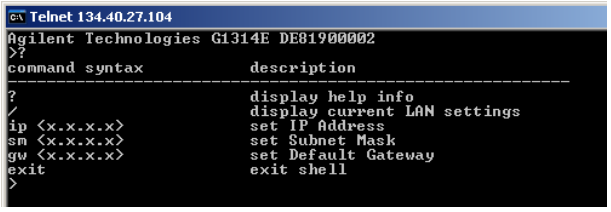

Figure 31 Telnet Commands

Table 20 Telnet Commands

Value	Description
?	displays syntax and descriptions of commands
/	displays current LAN settings
ip <x.x.x.x>	sets new ip address
sm <x.x.x.x>	sets new subnet mask
gw <x.x.x.x>	sets new default gateway
exit	exits shell and saves all changes

4 To change a parameter follows the style:

- parameter value, for example:
  `ip 134.40.27.230`

Then press [Enter], where parameter refers to the configuration parameter you are defining, and value refers to the definitions you are assigning to that parameter. Each parameter entry is followed by a carriage return.

5 Use the "/" and press Enter to list the current settings.

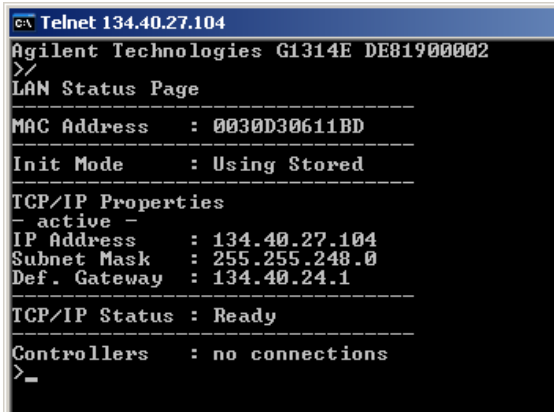

Figure 32 Telnet - Current settings in "Using Stored" mode

6 Change the IP address (in this example 134.40.27.99) and type "/" to list current settings.

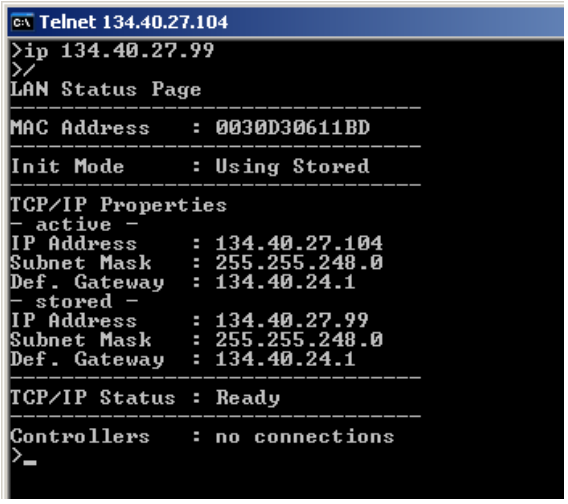

Figure 33 Telnet - Change IP settings

7 When you have finished typing the configuration parameters, type **exit** and press [Enter] to exit with storing parameters.

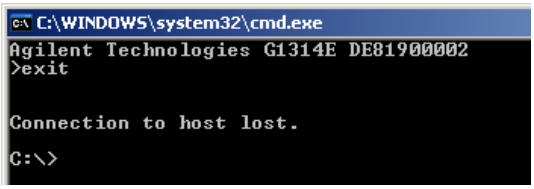

Figure 34 Closing the Telnet Session

NOTE If the Initialization Mode Switch is changed now to “Using Stored” mode, the instrument will take the stored settings when the module is re-booted.

With the Instant Pilot (G4208A)

To configure the TCP/IP parameters before connecting the detector to the network, the Instant Pilot (G4208A) can be used.

1 From the Welcome screen press the **More** button.

2 Select **Configure.**

3 Press the **VWD** button.

4 Scroll down to the LAN settings.

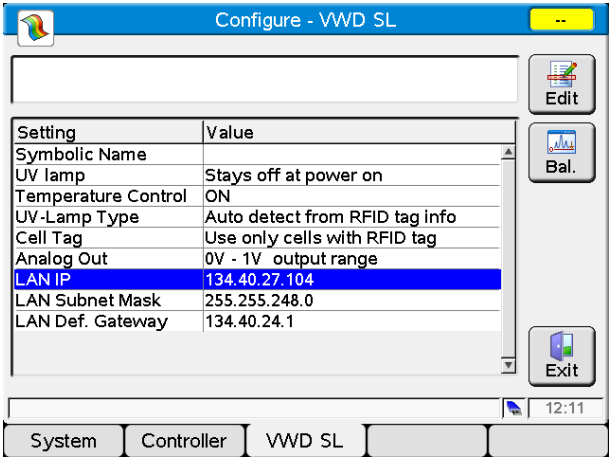

Figure 35 Instant Pilot - LAN Configuration

5 Press the **Edit** button (only visible if not in Edit mode), perform the required changes and press the **Done** button.

6 Leave the screen by clicking **Exit**.

5 Using the Detector

Setting up an Analysis 92
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This chapter provides information on how to set up the detector for an analysis and explains the basic settings.

Setting up an Analysis

This chapter can be used for

- preparing the system,
- to learn the set up of an HPLC analysis and
- to use it as an instrument check to demonstrate that all modules of the system are correctly installed and connected. It is not a test of the instrument performance.
- Learn about special settings

Before Using the System

Solvent Information

Observe recommendations on the use of solvents in chapter “Solvents” in the pump’s reference manual.

Priming and Purging the System

When the solvents have been exchanged or the pumping system has been turned off for a certain time (for example, overnight) oxygen will re-diffuse into the solvent channel between the solvent reservoir, vacuum degasser (when available in the system) and the pump. Solvents containing volatile ingredients will slightly lose these. Therefore priming of the pumping system is required before starting an application.

Table 21 Choice of Priming Solvents for Different Purposes

Activity	Solvent	Comments
After an installation	Isopropanol	Best solvent to flush air out of the system
When switching between reverse phase and normal phase (both times)	Isopropanol	Best solvent to flush air out of the system
After an installation	Ethanol or Methanol	Alternative to Isopropanol (second choice) if no Isopropanol is available
To clean the system when using buffers	Bidistilled water	Best solvent to re-dissolve buffer crystals
After a solvent change	Bidistilled water	Best solvent to re-dissolve buffer crystals
After the installation of normal phase seals (P/N 0905-1420)	Hexane + 5% Isopropanol	Good wetting properties

NOTE The pump should never be used for priming empty tubings (never let the pump run dry). Use a syringe to draw enough solvent for completely filling the tubings to the pump inlet before continuing to prime with the pump.

1 Open the purge valve of your pump (by turning it counterclockwise) and set flow rate to 3-5 ml/min.
2 Flush all tubes with at least 30 ml of solvent.
3 Set flow to required value of your application and close the purge valve.

NOTE Pump for approximately 10 minutes before starting your application.

Requirements and Conditions

What You Will Need

The table below lists the items you need to have for the set up of the analysis. Some of these are optional (not required for the basic system).

Table 22 What you will need

Agilent 1200 Infinity Series system	Pump (plus degassing)
	Autosampler
	Detector, standard flow cell installed
	Degasser (optional)
	Column Compartment (optional)
	Agilent ChemStation Instant Pilot G4208, optional for basic operation.
	System should be correctly set up for LAN communication with the Agilent ChemStation
Column:	Zorbax Eclipse XDB-C8, 4.6 x 150 mm, 5 µm, Part No. 993967-906
Standard:	Part No. 01080-68704 0.15 wt.% dimethylphthalate, 0.15 wt.% diethylphthalate, 0.01 wt.% biphenyl, 0.03 wt.% o-terphenyl in methanol

Conditions

A single injection of the isocratic test standard is made under the conditions given in Table 23 on page 94:

Table 23 Conditions

Flow	1.5 mL/min
Stoptime	8 min
Solvent	100% (30% water/70% Acetonitrile)
Temperature	Ambient

Table 23 Conditions

Wavelength	sample 254 nm
Injection Volume	1 µL
Column Temperature (optional):	25 °C or ambient

Typical Chromatogram

A typical chromatogram for this analysis is shown in Figure 36 on page 95. The exact profile of the chromatogram will depend on the chromatographic conditions. Variations in solvent quality, column packing, standard concentration and column temperature will all have a potential effect on peak retention and response.

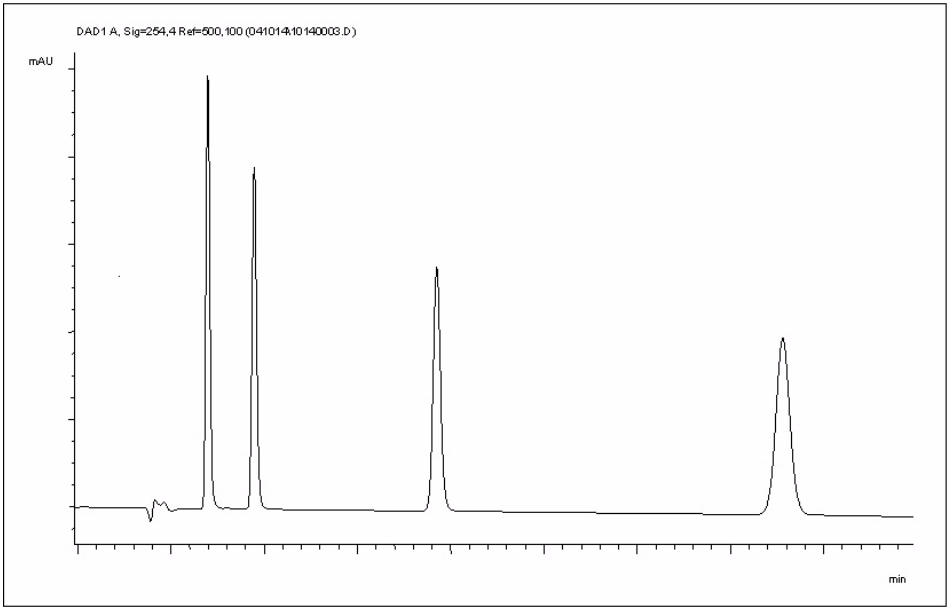


Figure 36 Typical Chromatogram with UV-detector

Optimization of the System

The settings used for this analysis are specific for this purpose. For other applications the system can be optimized in various ways. Please refer to the section "Optimizing the Detector Performance" on page 120.

Preparing the HPLC System

1 Turn on the Agilent ChemStation PC and the monitor.

2 Turn on the modules.

3 Start the Agilent ChemStation software. If the pump, autosampler, thermostatted column compartment and detector are found, the Agilent ChemStation screen should look like shown in Figure 37 on page 96. The System status is red (**Not Ready**).

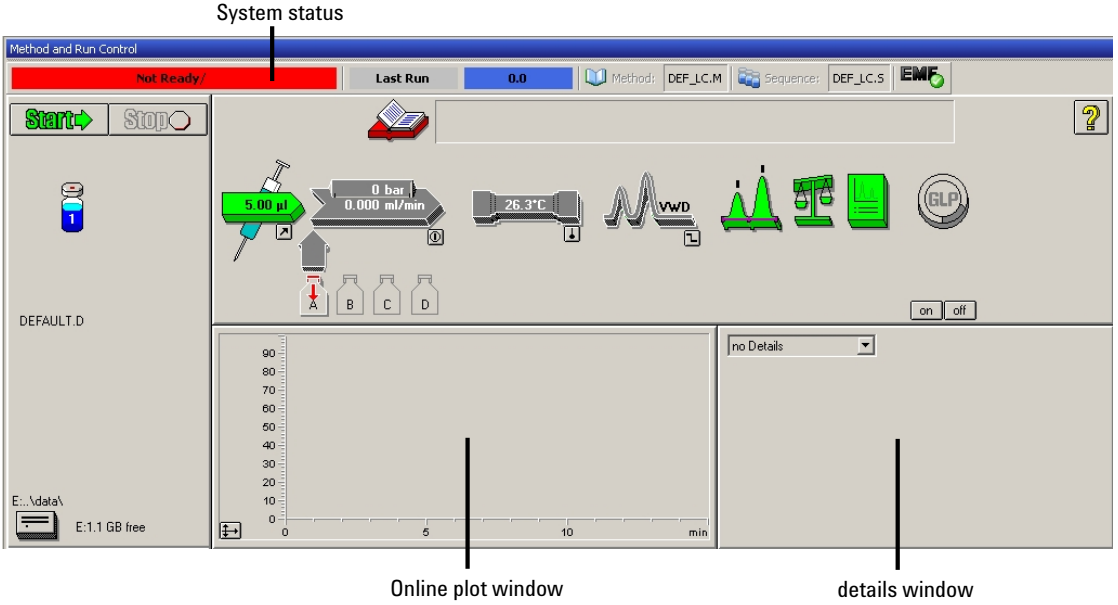


Figure 37 Initial Agilent ChemStation screen (**Method and Run Control**)

4 Turn on the detector lamp, pump and autosampler by clicking the **System On** button or the buttons below the module icons on the graphical user interface (GUI).

After some time, the pump, thermostatted column compartment and detector module will turn to green.

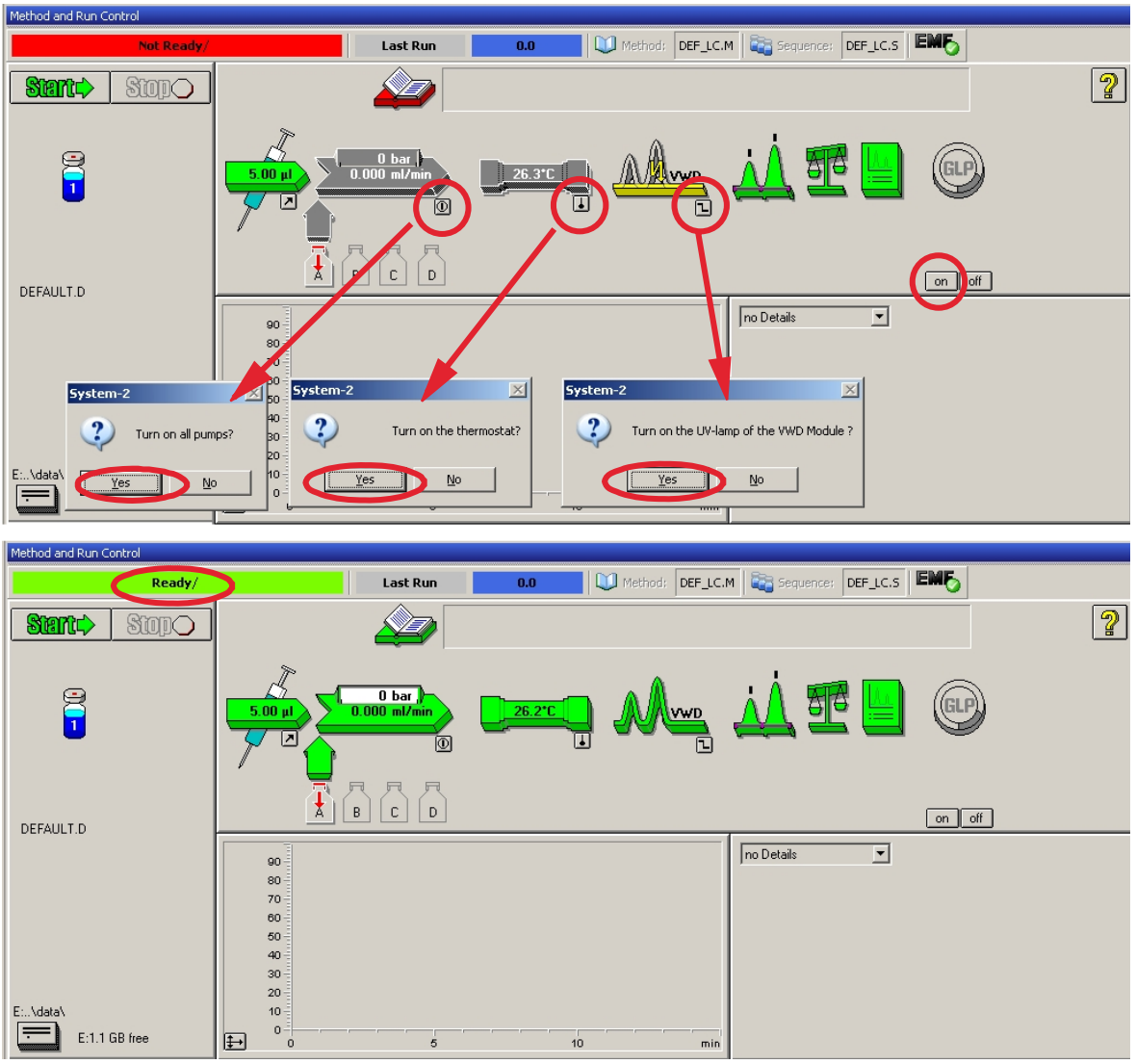


Figure 38 Turning on the HPLC Module

5 Purge the pump. For more information “Priming and Purging the System” on page 92.

6 Allow the detector to warm up of at least 60 minutes to provide a stable baseline (example: Figure 39 on page 98).

NOTE For reproducible chromatography, the detector and lamp should be on for at least one hour. Otherwise the detector baseline may still drift (depending on the environment).

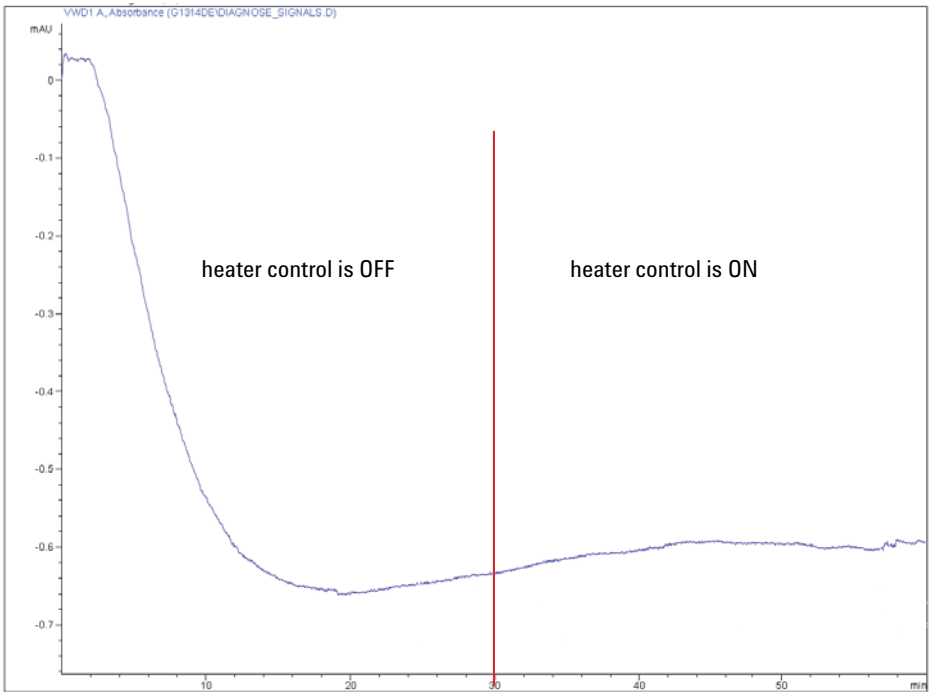


Figure 39 Stabilization of baseline after turn on of detector

7 For the isocratic pump, fill the solvent bottle with the mixture of HPLC-grade bi-distilled water (30 %) and acetonitrile (70 %). For binary- and quaternary pumps you can use separate bottles.

8 Click on the **Load Method** button and select **DEF_LC.M** and press **OK**. Alternative double-click on the method in the method window. The default LC method parameters are transferred into the Agilent 1200 Infinity Series modules.

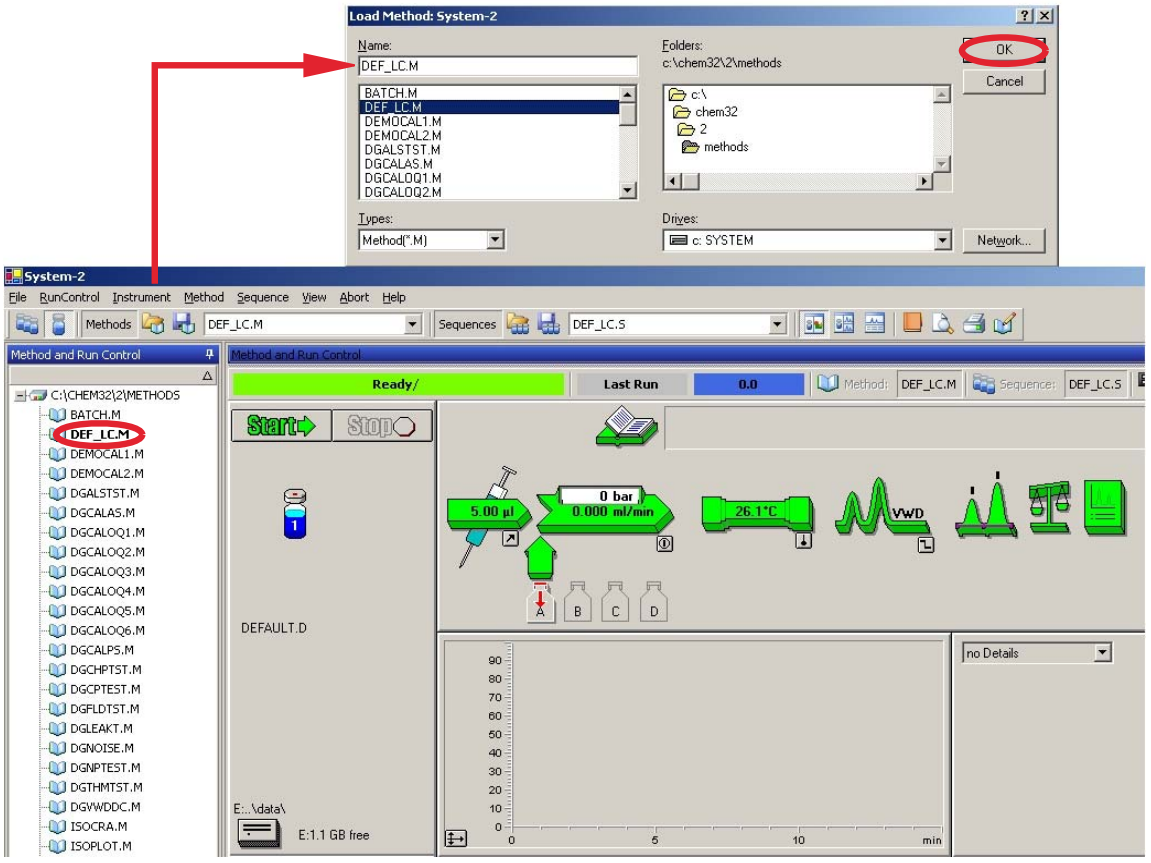


Figure 40 Loading Default LC Method

9 Click on the module icons (Figure 41 on page 100) and open the **Setup** of these modules. Figure 42 on page 101 shows the detector settings (do not change the detector parameters at this time).

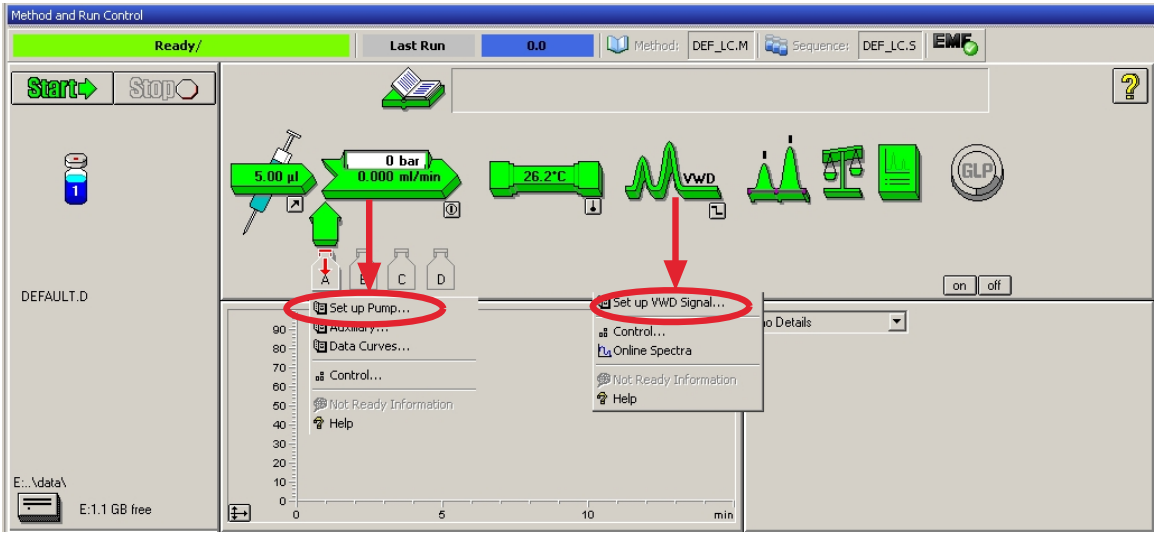
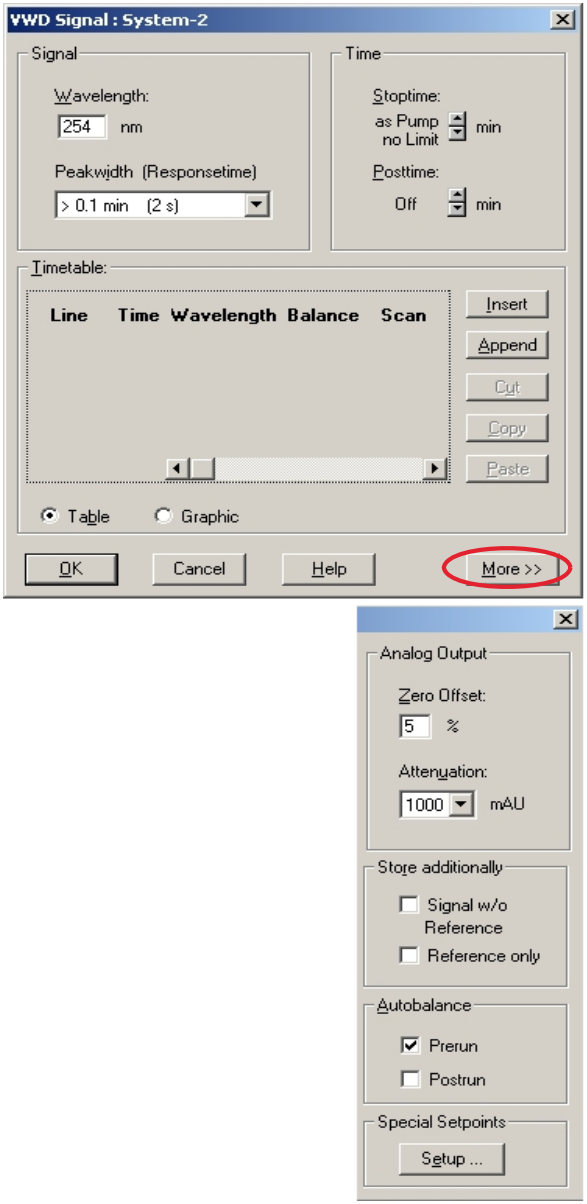


Figure 41 Open the module menu

10 Enter the pump parameters mentioned under Table 23 on page 94.



- 1 signal with individual wavelength setting
- stop and post time can be set (if required)
- peakwidth depends on the peaks in the chromatogram, see "Peakwidth Settings" on page 111.
- time table for programmable actions during the run

- Zero Offset Limits: 1 to 99 % in steps of 1 %
- Attenuation Limits: 0.98 to 4000 mAU at discrete values for either 100 mV or 1 V full scale
- additional signals can be stored with the normal signal (for diagnostics)
- autobalance to zero absorbance (on the analog output plus offset) at begin and/or end of run
- see "Special Setpoints" on page 111.

Figure 42 Detector Settings (default)

11 Pump the water/acetonitrile (30/70 %) mobile phase through the column for 10 minutes for equilibration.

12 Click the button and select **Change...** to open the Signal Plot information. Select the **Pump: Pressure** and the **VWD A: Signal 254** as signals. Change the Y-range for the VWD to 1 mAU and the offset to 20 % and the pressure offset to 50 %. The X-axis range should be 15 minutes. Press **OK** to exit this screen.

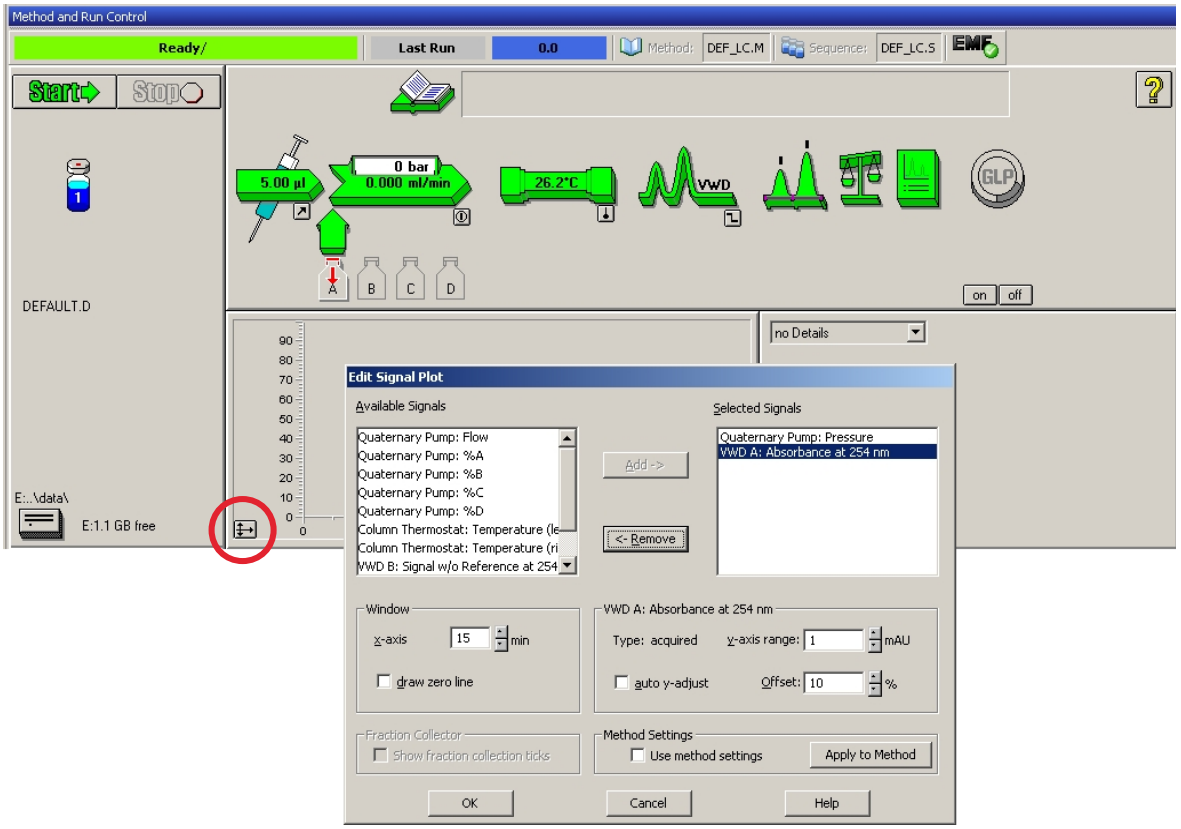


Figure 43 Edit Signal Plot Window

The Online Plot (Figure 44 on page 103) shows both, the pump pressure and the detector absorbance signals. Pressing **Adjust** the signals can be reset to the offset value and **Balance** would do a balance on the detector.

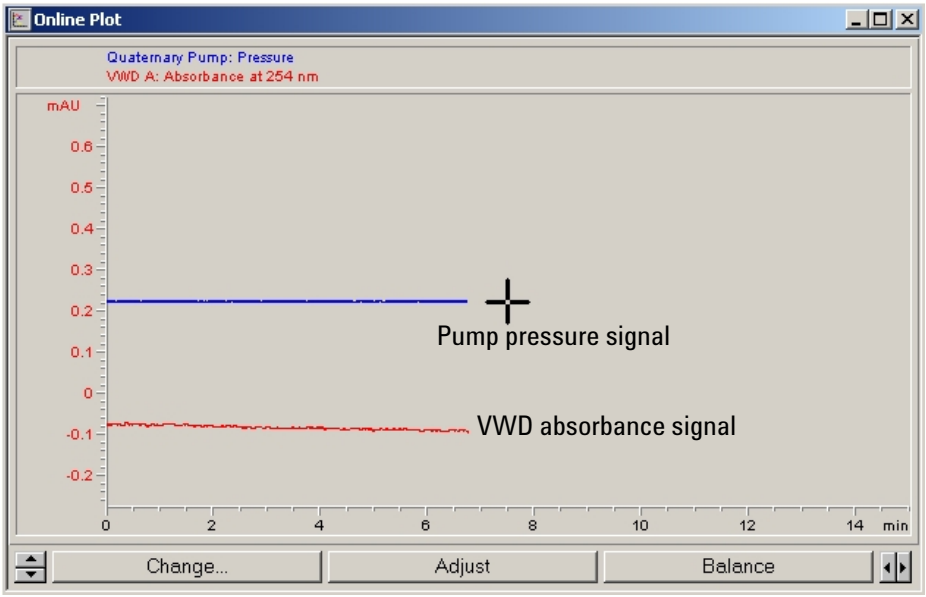


Figure 44 Online Plot Window

13 If both baselines are stable, set the Y-range for the detector signal to 100 mAU.

NOTE If you start with a new UV-lamp for the first time, the lamp may show initial drift for some time (burn-in effect).

14 Select the menu item **RunControl** > **Sample Info** and enter information about this application (Figure 45 on page 104). Press **OK** to leave this screen.

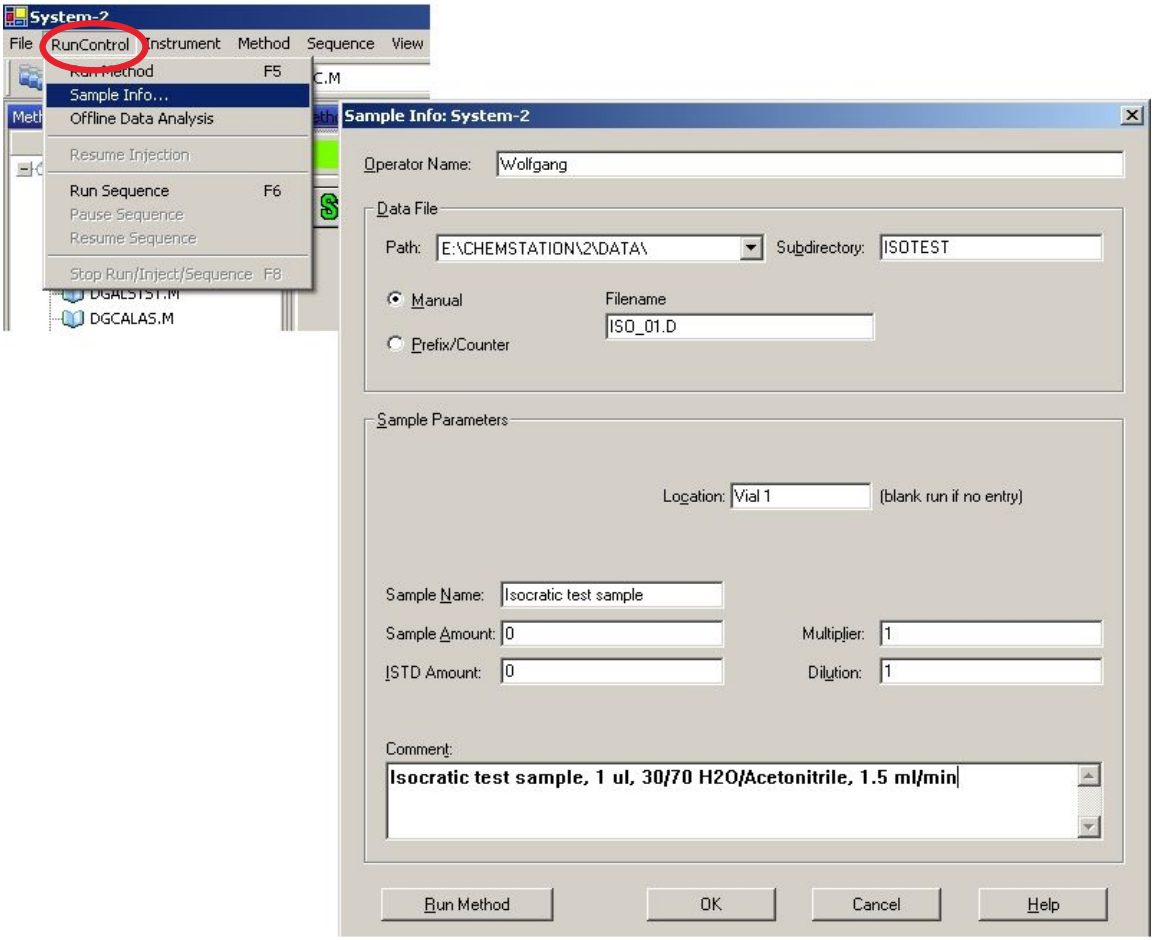


Figure 45 Sample Information

15 Fill the content of an isocratic standard sample ampoule into a vial and seal the vial with a cap and place the vial into autosampler tray (position #1).

Running the Sample and Verifying the Results

1 To start a run select the menu item **RunControl** > **Run Method**.

2 This will start the modules and the online plot on the Agilent ChemStation will show the resulting chromatogram.

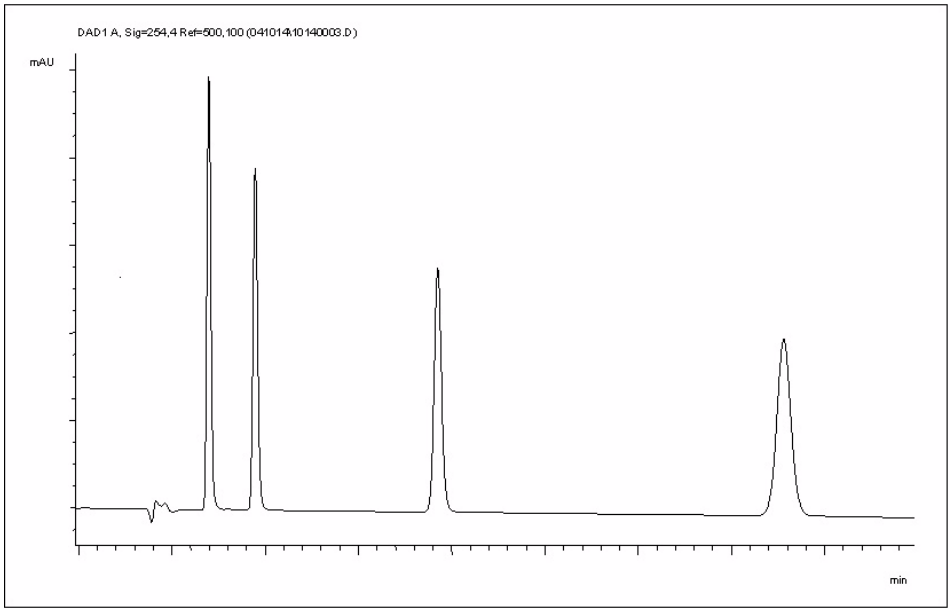


Figure 46 Chromatogram with Isocratic Test Sample

NOTE Information about using the Data Analysis functions can be obtained from the Using your ChemStation manual supplied with your system.

Special Settings of the Detector

In this chapter special settings of the detector are described.

Control Settings

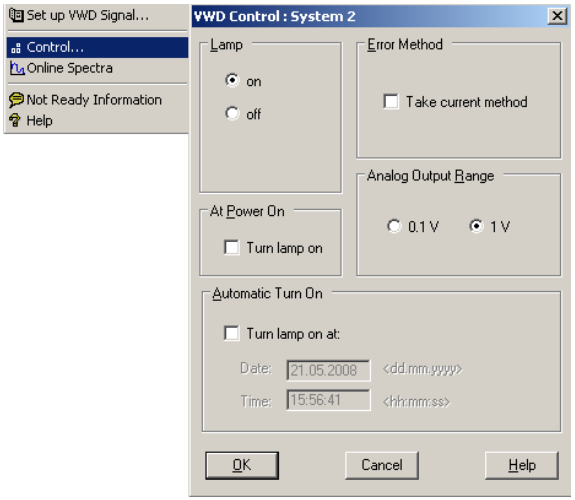
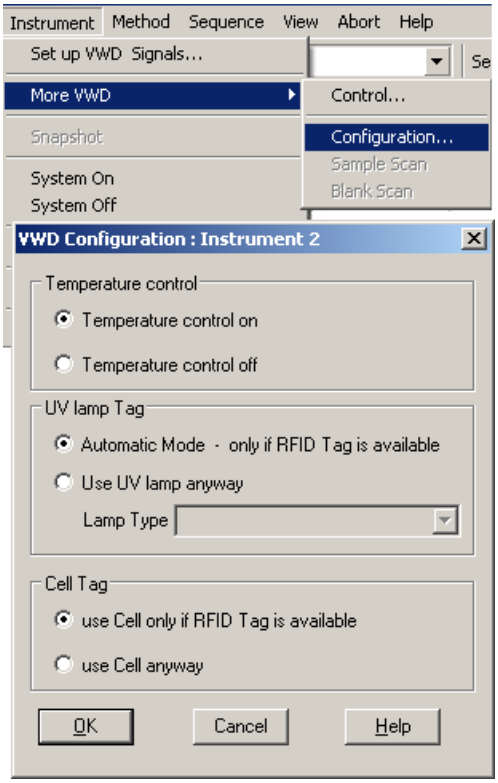


Figure 47 Detector control settings

- **Lamp**: turn on and off of UV-lamp.
- **At Power On**: automatic lamp-on at power on.
- **Error Method**: take error method or current method (in case of an error).
- **Analog Output Range**: can be set to either 100 mV or 1 V full scale, see "Analog Output Settings" on page 110.
- **Automatic Turn On**: lamps can be programmed (detector must be on for this).
- **Help**: online help.

Configuration Settings



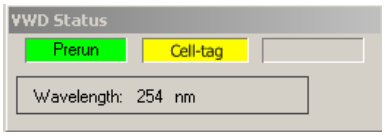


Figure 48 Detector Configuration Settings

- **Temperature Control**: the optical unit is kept on constant temperature (some degrees above ambient) and improves the baseline stability in unstable environments. See also note below.
- **UV lamp tag**: Automatic mode for Agilent lamps with RFIDtags. If no RFID tag lamp is used, detector icon will become gray (lamp tag not ready) and analysis is disabled.

  The specifications are based on the lamp with RFID tag.

  Use UV lamp anyway - here you can select non-RFID tag lamps, such as of type VWD lor DAD (have different heating mechanismn).

  The correct selection is important for optimal performance and lifetime.
- **Cell tag**: for Agilent flow cells with RFID tags. If no RFID tag cell is used, detector icon will become gray (cell tag not ready) and analysis is disabled.
- **Help**: online help.

The detector status shows “Cell-tag” in yellow in case the flow cell with the RFID tag is not inserted. The detector icon is gray and the system is not ready.

NOTE If the flow cell temperature is critical for your chromatography or your environment is stable, you may set the Temperature Control to off. This will lower the optical unit and flow cell temperature by some degree.

Online Spectra

1 To view the online spectra select **Online Spectra**.

NOTE This online spectrum is taken during a stop-flow condition only while the peak is kept in the flow cell, see "Scanning with the VWD" on page 109.

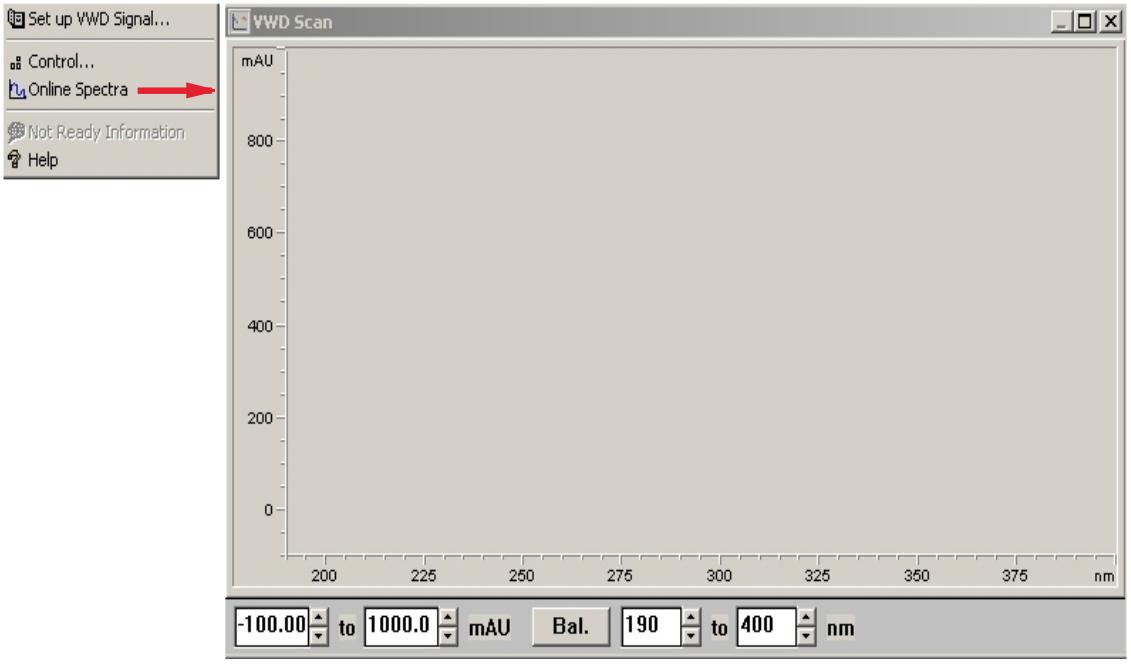


Figure 49 Online Spectra Window

2 Change the absorbance and wavelength range according your needs.

Scanning with the VWD

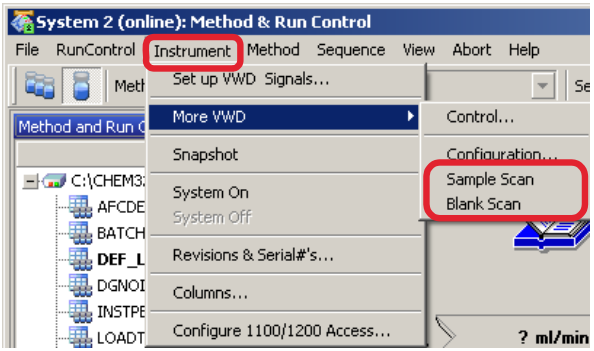
NOTE Access to the scan feature is only possible during run.

1 Set up a run.

2 Start a run.

3 While running on the baseline, select from the menu **Instrument** > **More VWD** > **Blank Scan**.

A background scan is stored in the memory.



- *Step 1:* **Blank Scan**: scan of the background (solvent) is stored in the memory.
- *Step 2:* **Sample Scan**: scan of the peak of interest is taken while the peak stays in the flow cell (stop-flow condition).
- **Online Spectrum**: **Sample Scan** minus **Blank Scan**.

4 When the peak of interest enters the flow cell, stop the flow (set flow rate to zero or open the purge valve) and wait a few moments to stabilize the concentration.

NOTE Turning off the pump would stop the run and no access to the sample scan is possible.

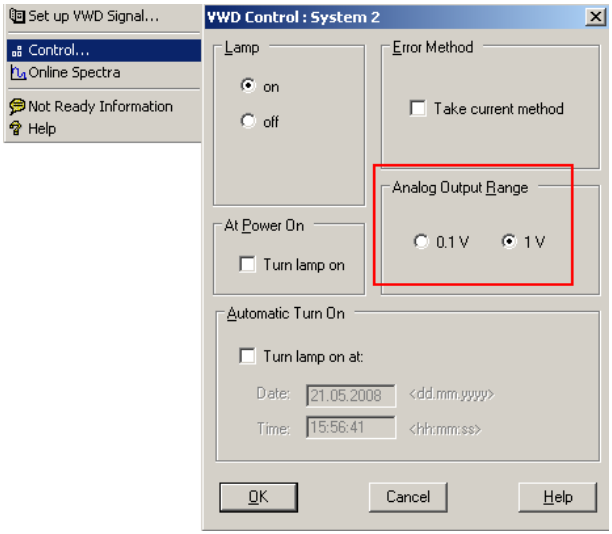
5 Select from the menu **Instrument** > **More VWD** > **Sample Scan**.

A sample scan is taken in the range defined under "Special Setpoints" on page 111 and the Online Spectra window (see "Online Spectra" on page 108) displays the result (Sample Scan minus Blank Scan).

Analog Output Settings

1 To change the Output Range of the analog outputs select **VWD Control**.

2 To change the offset and the attenuation select **VWD Signal** > **More**.



- **Analog Output Range**: can be set to either 100 mV or 1 V full scale.
- **Zero Offset**:can be set to either 100 mV or 1 V full scale.
- **Attenuation Limits**: 0.98 to 4000 mAU at discrete values for either 100 mV or 1 V full scale.

Figure 50 Analog Output Settings

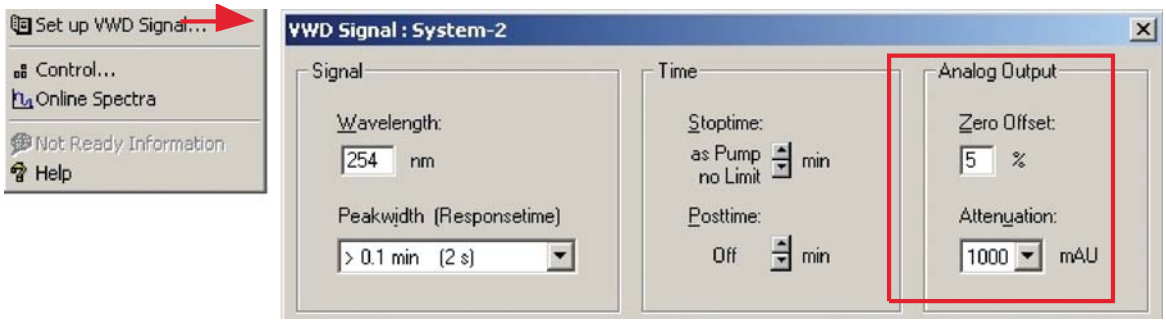


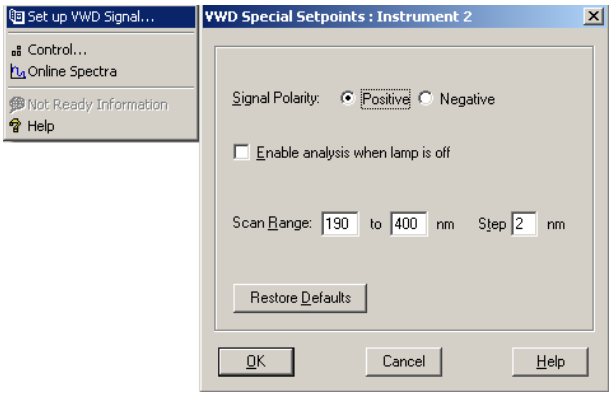
Figure 51 Analog Output Settings

3 Change the values if required.

Special Setpoints

1 To change the offset and the attenuation select **VWD Signal** > **More** > **Special Setpoints**.

Table 24



- **Signal Polarity**: can be switched to negative (if required).
- **Enable analysis when lamp is off**: if the VWD is not used in a dual detector setup (lamp off), the not-ready condition is not stopping the analysis.
- **Scan Range / Step**: Used for stop-flow scanning, see "Scanning with the VWD" on page 109.

Figure 52 Special Setpoints

Peakwidth Settings

NOTE Do not use peak width shorter than necessary, see details below.

1 To change the Peakwidth settings select **Setup Detector Signals**.
2 In the section **Peakwidth (Responsetime)** click on the drop-down list.
3 Change the Peakwidth according to your needs.

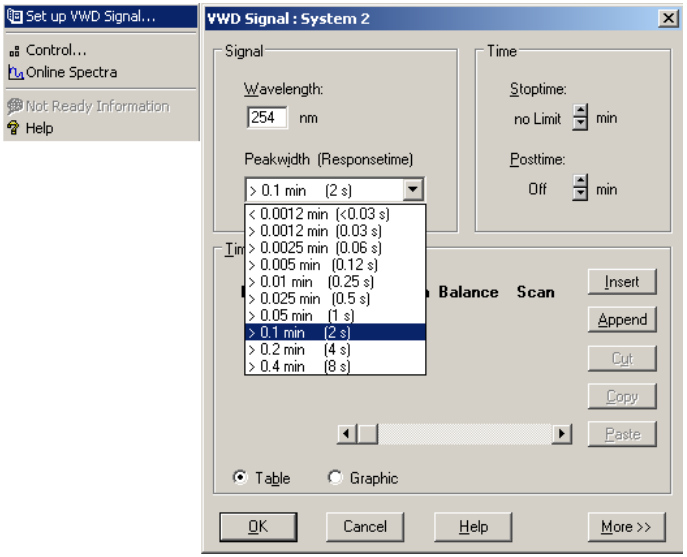


Figure 53 Peakwidth Setting

Peakwidth enables you to select the peak width (response time) for your analysis. The peak width is defined as the width of a peak, in minutes, at half the peak height. Set the peak width to the narrowest expected peak in your chromatogram. The peak width sets the optimum response time for your detector. The peak detector ignores any peaks that are considerably narrower, or wider, than the peak width setting. The response time is the time between 10 % and 90 % of the output signal in response to an input step function. When the All spectrum storage option is selected, then spectra are acquired continuously depending on the setting of the peak width. The time specified by the peak width is used as a factor in the acquisition of spectra. The acquisition time for one spectrum is slightly less than the peak width divided by 8, see Table 25 on page 113 .

Limits: When you set the peak width (in minutes), the corresponding response time is set automatically and the appropriate data rate for signal acquisition is selected as shown in Table 25 on page 113 .

Table 25 Peak Width – Response Time – Data Rate (G1314D)

peakwidth at half heigth [min]	Response Time [s]	Data Rate [Hz]
<0.005	<0.12	20
>0.005	0.12	20
>0.01	0.25	20
>0.025	0.5	20
>0.05	1.0	10
>0.10	2.0	5
>0.20	4.0	2.5
>0.40	8.0	1.25

Table 26 Peak Width - Response Time - Data Rate (G1314F)

peakwidth at half heigth [min]	Response Time [s]	Data Rate [Hz]
<0.003125	<0.0625	80
>0.003125	0.0625	80
>0.00625	0.125	80
>0.0125	0.25	40
>0.025	0.5	20
>0.05	1	10
>0.1	2	5
>0.2	4	2.5
>0.4	8	1.25

Table 27 Peak Width – Response Time – Data Rate (G1314E)

peakwidth at half heigth [min]	Response Time [s]	Data Rate [Hz]
<0.0012	<0.03	160
>0.0012	0.03	160
>0.0025	0.06	160
>0.005	0.12	80
>0.01	0.25	40
>0.025	0.5	20
>0.05	1.0	10
>0.1	2.0	5
>0.2	4.0	2.5
>0.4	8.0	1.25

Run Recovery (G1314E)

NOTE This feature is not supported with ChemStation B.03.02 SR1. It will be implemented with ChemStation B.04.01. The figures used in this chapater are from the G1315C DAD VL+. The G1314E VWD figures will look the same.

Run Recovery Settings

CAUTION For this recovery mode the CompactFlash Card must be in the detector.

If the LAN communiaction is interruppted, no data is stored.

➔ Have the CompactFlash Card always inserted.

The detector supports run buffering, which means that an amount of run data (*.uv and *.ch files) is stored in a storage medium (CompactFlash Card) in the detector until either it is overwritten or the detector undergoes a power cycle.

If there is a temporary network failure or the PC is not able to constantly take the data, the stored data is transferred to the ChemStation automatically when the network connection is restored or the PC can take the data, so that no loss of data occurs.

If there is a permanent network failure, the Run Recovery dialog box allows you to restore the stored data to the data directory. From there you can copy the files to the directory where the files are corrupted or not complete.

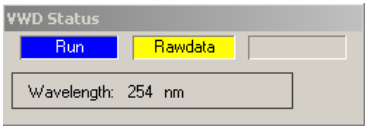
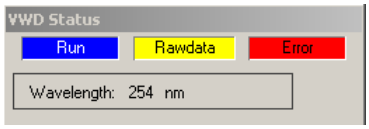
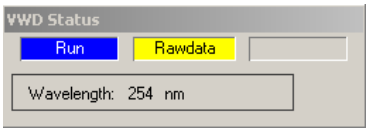
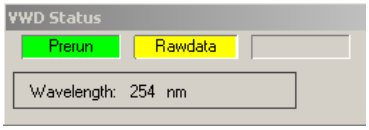
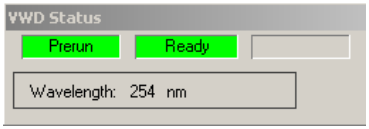
NOTE On very large recovery files it may take a long time to restore it to the Agilent ChemStation.

A sequence will be stopped in case of a network problem.

NOTE When during recovery an error “Method/Sequence stopped” appears, the instrument logbook shows an entry “No Run data available in device“.

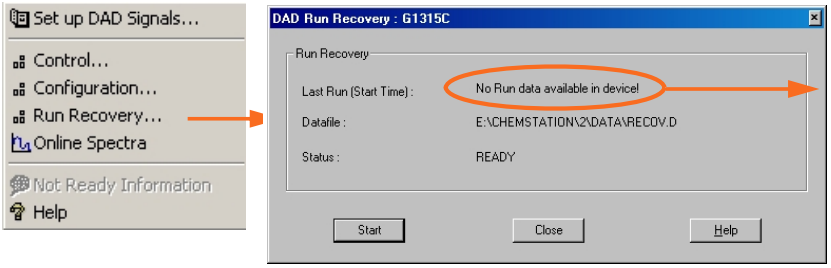
Automated Run Recovery in case of temporary communication failures

Table 28 Automated Run Recovery in case of temporary communication failures

Situation	Reaction	On ChemStation
All OK	• Run in progress - Data Analysis • Run / Rawdata • Elapsed run time is running • Spectra counter is running • Data are stored on PC and on card	
LAN breaks	• Run in progress - Data Analysis • Run / Rawdata • Error Power Fail • Elapsed run time stops • Spectra counter stops • Data continues to be stored on card	
LAN recovers	• Run in progress - Data Analysis • Run / Rawdata • Error Power Fail cleared • Elapsed run time continues at actual time • Spectra counter continues • Data continues to be stored on PC and on card • ChemStation tries already to add missing data (depends on the data load).	
Stop time elapsed	• Run in progress - Data Analysis • Prerun / Rawdata • Elapsed run time stops • Spectra counter continues • ChemStation continues to add missing data	
Run ends	• Ready • Run finished • Prerun / Ready	

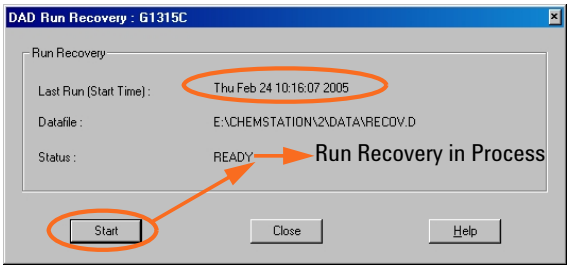
NOTE If the detector status window is not opened, you will realize only the Power Fail error and the long Run In Progress information until the data is recovered from disk.

Manual Run Recovery in case of permanent communication failures

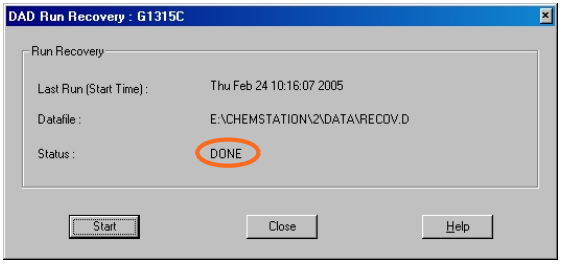


see Note below

Start a recover



After a recover



NOTE When during recovery an error “Method/Sequence stopped” appears, the instrument logbook shows an entry “No Run data available in device“.

6
How to optimize the detector

Optimizing the Detector Performance 120
Match the Flow Cell to the Column 121
Set the Detector Parameters 124

This chapter gives hints on how to select the detector parameters and the flow cell.

Optimizing the Detector Performance

The detector has a variety of parameters that can be used to optimize performance.

The information below will guide you on how to get the best detector performance. Follow these rules as a start for new applications. It gives a rule-of-thumb for optimizing the detector parameters.

Match the Flow Cell to the Column

The tables below recommend the flow cell that matches the column used. If more than one selection is appropriate, use the larger flow cell to get the best detection limit. Use the smaller flow cell for best peak resolution.

Standard HPLC Applications

Column length	Typical peak width	Recommended flow cell				
<= 5 cm	0.025 min	Micro flow cell	Semimicro flow cell	Standard flow cell		High Pressure flow cell
10 cm	0.05 min					
20 cm	0.1 min					
>= 40 cm	0.2 min					
	Typical flow rate	0.05-0.2 ml/min	0.2- 0.4 ml/min	0.4- 0.8 ml/min	1-2 ml/min	0.01- 5 ml/min
	Internal column diameter	1.0 mm	2.1mm	3.0 mm	4.6 mm	

Figure 54 Choosing a Flow Cell (Standard HPLC Applications)

Ultra fast separation with RRLC systems

Column ID	2.1 mm	3.0 mm	4.6 mm
Configuration	No damper No mixer ++	Damper Mixer	Damper Mixer
Flow cell	2 µl, 3 mm	5 µl, 6 mm +	14 µl, 10 mm +

Figure 55 Choosing a Flow Cell for G1314E (for ultra fast separation with RRLC systems)

- (+) For ultra fast analysis with step gradients the micro flow cell (2 µL, 3 mm) gives the best performance
- (++) In high resolution analysis time is not the highest priority. Higher delay volumes are accepted. Therefore we recommend to use the damper plus mixer for a highest signal to noise.
- If longer columns (> 50 mm) for higher resolution are used, then the next larger flow cell is the preferred choice for higher sensitivity.

Flow Cell Path Length

Lambert-Beer's law shows a linear relationship between the flow cell path length and absorbance.

$$\text{Absorbance} = -\log T = \log \frac{I_0}{I} = \varepsilon \times C \times d$$

where

T	is the transmission, defined as the quotient of the intensity of the transmitted light I divided by the intensity of the incident light, I_0,
e	is the extinction coefficient, which is a characteristic of a given substance under a precisely-defined set of conditions of wavelength, solvent, temperature and other parameters,
C [mol/L]	is the concentration of the absorbing species,
d [cm]	is the path length of the cell used for the measurement.

Therefore, flow cells with longer path lengths yield higher signals. Although noise usually increases little with increasing path length, there is a gain in signal-to-noise ratio. For example, in Figure 56 on page 123 the noise increased by less than 10 % but a 70 % increase in signal intensity was achieved by increasing the path length from 6 mmFigure 56 on page 123 to 10 mm.

When increasing the path length, the cell volume usually increases – in the example from 5 – 13 µL. Typically, this causes more peak dispersion. As demonstrated, this did not affect the resolution in the gradient separation in the example shown below.

As a rule-of-thumb the flow cell volume should be about 1/3 of the peak volume at half height. To determine the volume of your peaks, take the peak width as reported in the integration results multiply it by the flow rate and divide it by 3).

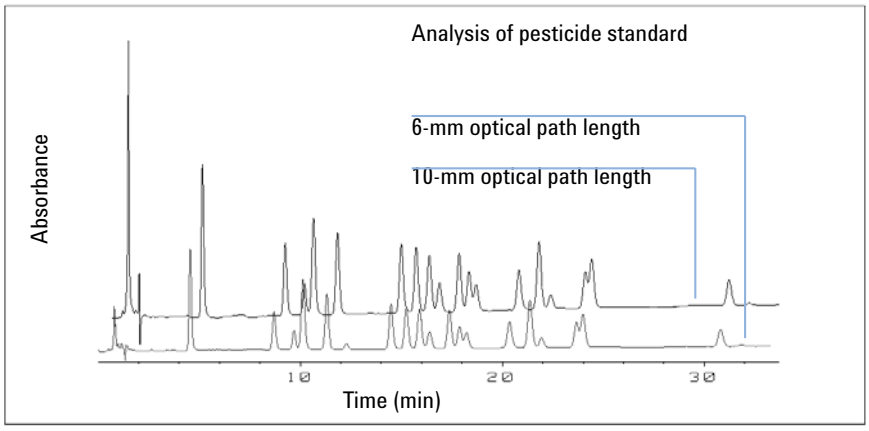


Figure 56 Influence of Cell Path Length on Signal Height

Traditionally LC analysis with UV detectors is based on comparing measurements with internal or external standards. To check photometric accuracy of the Agilent 1200 Series Infinity Variable Wavelength Detector it is necessary to have more precise information on path lengths of the VWD flow cells.

The correct response is:

expected response * correction factor

Please find below the details of the Agilent 1200 Infinity Series Variable Wavelength Detector flow cells:

Table 29 Correction factors for Agilent VWD flow cells

Part number	Path length (actual)	Correction factor
Standard flow cell 10 mm, 14 µL (p/n G1314-60186)	10.15 ± 0.19 mm	10/10.15
Semi-micro flow cell 6 mm, 5 µL (p/n G1314-60183)	6.10 ± 0.19 mm	6/6.10
Micro flow cell 3 mm, 2 µL (p/n G1314-60187)	2.80 ± 0.19 mm	3/2.8
High pressure flow cell 10 mm, 14 µL (p/n G1314-60182)	10.00 ± 0.19 mm	6/5.75

NOTE However you have to be aware that there are additional tolerance of gasket thickness and its compression ratio which is supposed to be very small in comparison with the machining tolerance.

Set the Detector Parameters

1. Set peakwidth as close as possible to the width (at half height) of a narrow peak of interest. Refer to "Peakwidth Settings" on page 111.
2. Choose the sample wavelength.
   - at a longer wavelength than the cut-off wavelength of the mobile phase,
   - at a wavelength where the analytes have strong absorptivity if you want to get the lowest possible detection limit,
   - at a wavelength with moderate absorptivity if you work with high concentrations, and
   - preferably where the spectrum is flat for better linearity.
3. Consider to use time-programming to further optimization.

7
Troubleshooting and Diagnostics

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Overview about the troubleshooting and diagnostic features.

Overview of the Detector's Indicators and Test Functions

Status Indicators

The detector is provided with two status indicators which indicate the operational state (prerun, run, and error states) of the detector. The status indicators provide a quick visual check of the operation of the detector "Status Indicators" on page 127.

Error Messages

In the event of an electronic, mechanical or hydraulic failure, the detector generates an error message in the user interface. For each message, a short description of the failure, a list of probable causes of the problem, and a list of suggested actions to fix the problem are provided by the user interface. Refer to the Service Manual for details.

Test Functions

A series of test functions are available for troubleshooting and operational verification after exchanging internal components. Refer to the User Interface and/or the Service Manual for details.

Wavelength Verification / Recalibration

Wavelength recalibration is recommended after repair of internal components, and on a regular basis to ensure correct operation of the detector. The detector uses the deuterium alpha and beta emission lines for wavelength calibration, see "Wavelength Verification-Calibration" on page 154.

Diagnostic Signals

The detector has several signals (internal temperatures, voltages and currents of lamps) that can be used for diagnosing baseline problems. Refer to the Service Manual for details.

Status Indicators

Two status indicators are located on the front of the detector. The lower left indicates the power supply status, the upper right indicates the detector status.

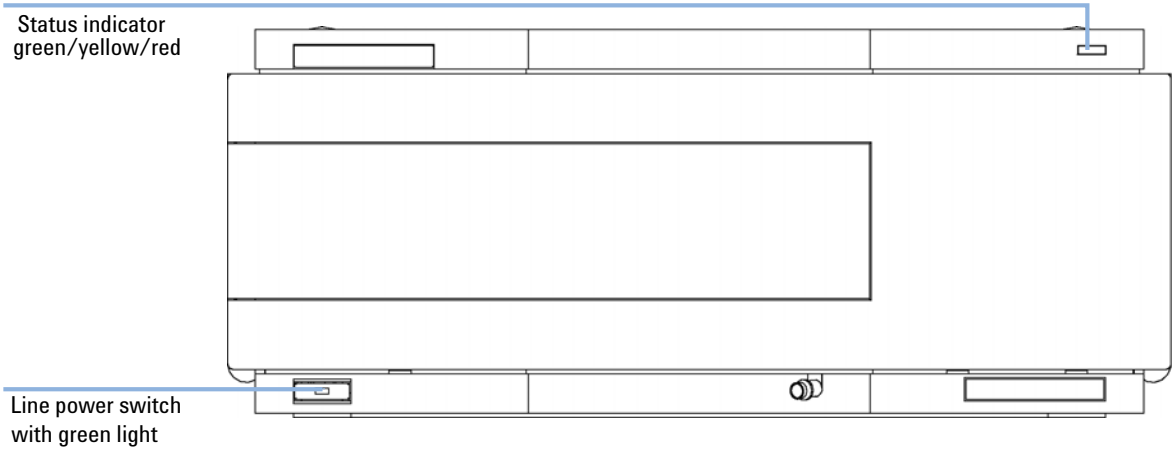

Figure 57 Location of Status Indicators

Power Supply Indicator

The power supply indicator is integrated into the main power switch. When the indicator is illuminated (*green*) the power is ON.

Module Status Indicator

The module status indicator indicates one of six possible module conditions:

- When the status indicator is *OFF* (and power switch light is on), the module is in a *prerun* condition, and is ready to begin an analysis.
- A *green* status indicator, indicates the module is performing an analysis (*run* mode).
- A *yellow* indicator indicates a *not-ready* condition. The module is in a not-ready state when it is waiting for a specific condition to be reached or completed (for example, immediately after changing a set point), or while a self-test procedure is running.
- An *error* condition is indicated when the status indicator is *red*. An error condition indicates the module has detected an internal problem which affects correct operation of the module. Usually, an error condition requires attention (e.g. leak, defective internal components). An error condition always interrupts the analysis.
- A *red-blinking* (modules with on-board LAN) or *yellow-blinking* (modules without on-board LAN) indicator indicates that the module is in resident mode (e.g. during update of main firmware).
- A *fast red-blinking* (modules with on-board LAN) or *fast yellow-blinking* (modules without on-board LAN) indicator indicates that the module is in boot loader mode (e.g. during update of main firmware). In such a case try to re-boot the module or try a cold-start.

Available Tests versus Interfaces

NOTE

Depending on the used interface, the available tests and the screens/reports may vary.

Preferred tool should be the Agilent Diagnostic Software, see "Agilent Lab Advisor Software" on page 130.

Screenshots used within these procedures are based on the Agilent ChemStation.

In future, a user interface may not show the Diagnostics/Tests anymore. Then the Agilent Diagnostic Software must be used instead.

The Agilent ChemStation may not include any maintenance/test functions.

Table 30 Available Tests versus Interfaces

Interface Test	Diagnostic Software	Agilent ChemStation	Instant Pilot G4208A
Wavelength Verification/Re-calibration	yes (*)	Tests (*)	Maintenance (*)
Lamp Intensity	yes (*)	Tests (*)	Diagnosis (*)
Holmium Test	yes (*)	Tests (*)	Diagnosis (*)
Cell Test	yes (*)	Tests (*)	n/a
D/A Converter Test	yes (*)	Tests (*)	n/a
Filter / Grating Motor Test	yes	Tests (*)	command line (***)
Test Chromatogram	yes	command line (**)	command line (***)
Spectrum (Blank, Sample, Holmium)	yes	n/a	Control
Service Dialog	for service only	n/a	for service only

(*) interface provides passed/fail information or a plot.

(**) requires a comand via comand line

(***) requires a comand via comand line in Service Mode

Agilent Lab Advisor Software

The Agilent Lab Advisor software is a standalone product that can be used with or without data system. Agilent Lab Advisor software helps to manage the lab for high quality chromatographic results and can monitor in real time a single Agilent LC or all the Agilent GCs and LCs configured on the lab intranet.

Agilent Lab Advisor software provides diagnostic capabilities for all Agilent 1200 Infinity Series modules. This includes diagnostic capabilities, calibration procedures and maintenance routines for all the maintenance routines.

The Agilent Lab Advisor software also allows users to monitor the status of their LC instruments. The Early Maintenance Feedback (EMF) feature helps to carry out preventive maintenance. In addition, users can generate a status report for each individual LC instrument. The tests and diagnostic features as provided by the Agilent Lab Advisor software may differ from the descriptions in this manual. For details refer to the Agilent Lab Advisor software help files.

This manual provides lists with the names of Error Messages, Not Ready messages, and other common issues.

8
Error Information

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This chapter describes the meaning of detector error messages, and provides information on probable causes and suggested actions how to recover from error conditions.

What Are Error Messages

Error messages are displayed in the user interface when an electronic, mechanical, or hydraulic (flow path) failure occurs which requires attention before the analysis can be continued (for example, repair, or exchange of consumables is necessary). In the event of such a failure, the red status indicator at the front of the module is switched on, and an entry is written into the module logbook.

General Error Messages

General error messages are generic to all Agilent series HPLC modules and may show up on other modules as well.

Timeout

The timeout threshold was exceeded.

Probable cause	Suggested actions
1 The analysis was completed successfully, and the timeout function switched off the module as requested.	Check the logbook for the occurrence and source of a not-ready condition. Restart the analysis where required.
2 A not-ready condition was present during a sequence or multiple-injection run for a period longer than the timeout threshold.	Check the logbook for the occurrence and source of a not-ready condition. Restart the analysis where required.

Shut-Down

An external instrument has generated a shut-down signal on the remote line.

The module continually monitors the remote input connectors for status signals. A LOW signal input on pin 4 of the remote connector generates the error message.

Probable cause	Suggested actions
1 Leak detected in another module with a CAN connection to the system.	Fix the leak in the external instrument before restarting the module.
2 Leak detected in an external instrument with a remote connection to the system.	Fix the leak in the external instrument before restarting the module.
3 Shut-down in an external instrument with a remote connection to the system.	Check external instruments for a shut-down condition.
4 The degasser failed to generate sufficient vacuum for solvent degassing.	Check the vacuum degasser for an error condition. Refer to the *Service Manual* for the degasser or the 1260 pump that has the degasser built-in.

Remote Timeout

A not-ready condition is still present on the remote input. When an analysis is started, the system expects all not-ready conditions (for example, a not-ready condition during detector balance) to switch to run conditions within one minute of starting the analysis. If a not-ready condition is still present on the remote line after one minute the error message is generated.

Probable cause	Suggested actions
1 Not-ready condition in one of the instruments connected to the remote line.	Ensure the instrument showing the not-ready condition is installed correctly, and is set up correctly for analysis.
2 Defective remote cable.	Exchange the remote cable.
3 Defective components in the instrument showing the not-ready condition.	Check the instrument for defects (refer to the instrument's documentation).

Synchronization Lost

During an analysis, the internal synchronization or communication between one or more of the modules in the system has failed.

The system processors continually monitor the system configuration. If one or more of the modules is no longer recognized as being connected to the system, the error message is generated.

Probable cause	Suggested actions
1 CAN cable disconnected.	• Ensure all the CAN cables are connected correctly. • Ensure all CAN cables are installed correctly.
2 Defective CAN cable.	Exchange the CAN cable.
3 Defective main board in another module.	Switch off the system. Restart the system, and determine which module or modules are not recognized by the system.

Leak Sensor Short

The leak sensor in the module has failed (short circuit).

The current through the leak sensor is dependent on temperature. A leak is detected when solvent cools the leak sensor, causing the leak-sensor current to change within defined limits. If the current increases above the upper limit, the error message is generated.

Probable cause	Suggested actions
1 Defective flow sensor.	Please contact your Agilent service representative.
2 Leak sensor incorrectly routed, being pinched by a metal component.	Please contact your Agilent service representative.

Leak Sensor Open

The leak sensor in the module has failed (open circuit).

The current through the leak sensor is dependent on temperature. A leak is detected when solvent cools the leak sensor, causing the leak-sensor current to change within defined limits. If the current falls outside the lower limit, the error message is generated.

Probable cause	Suggested actions
1 Leak sensor not connected to the main board.	Please contact your Agilent service representative.
2 Defective leak sensor.	Please contact your Agilent service representative.
3 Leak sensor incorrectly routed, being pinched by a metal component.	Please contact your Agilent service representative.

Compensation Sensor Open

The ambient-compensation sensor (NTC) on the main board in the module has failed (open circuit).

The resistance across the temperature compensation sensor (NTC) on the main board is dependent on ambient temperature. The change in resistance is used by the leak circuit to compensate for ambient temperature changes. If the resistance across the sensor increases above the upper limit, the error message is generated.

Probable cause	Suggested actions
1 Defective main board.	Please contact your Agilent service representative.

Compensation Sensor Short

The ambient-compensation sensor (NTC) on the main board in the module has failed (short circuit).

The resistance across the temperature compensation sensor (NTC) on the main board is dependent on ambient temperature. The change in resistance is used by the leak circuit to compensate for ambient temperature changes. If the resistance across the sensor falls below the lower limit, the error message is generated.

Probable cause	Suggested actions
1 Defective main board.	Please contact your Agilent service representative.

Fan Failed

The cooling fan in the module has failed.

The hall sensor on the fan shaft is used by the main board to monitor the fan speed. If the fan speed falls below a certain limit for a certain length of time, the error message is generated.

This limit is given by 2 revolutions/second for longer than 5 seconds.

Probable cause	Suggested actions
1 Fan cable disconnected.	Please contact your Agilent service representative.
2 Defective fan.	Please contact your Agilent service representative.
3 Defective main board.	Please contact your Agilent service representative.

Leak

A leak was detected in the module.

The signals from the two temperature sensors (leak sensor and board-mounted temperature-compensation sensor) are used by the leak algorithm to determine whether a leak is present. When a leak occurs, the leak sensor is cooled by the solvent. This changes the resistance of the leak sensor which is sensed by the leak-sensor circuit on the main board.

Probable cause	Suggested actions
1 Loose fittings.	Ensure all fittings are tight.
2 Broken capillary.	Exchange defective capillaries.

Open Cover

The top foam has been removed.

Probable cause	Suggested actions
1 Foam not activating the sensor.	Please contact your Agilent service representative.
2 Dirty or defective sensor.	Please contact your Agilent service representative.

Cover Violation

The top foam has been removed.

The sensor on the main board detects when the top foam is in place. If the foam is removed while the lamp is on (or if an attempt is made to switch on for example the lamp with the foam removed), the lamp is switched off, and the error message is generated.

Probable cause	Suggested actions
1 The top foam was removed during operation.	Please contact your Agilent service representative.
2 Foam not activating the sensor.	Please contact your Agilent service representative.

Detector Error Messages

These errors are detector specific.

Lamp Current Missing

The lamp anode current is missing. The processor continually monitors the anode current drawn by the lamp during operation. If the anode current falls below the lower current limit, the error message is generated.

Probable cause	Suggested actions
1 Lamp disconnected.	Ensure the lamp connector is seated firmly.
2 Top foam removed while lamp is on.	Replace the top foam, and turn ON the lamp.
3 Defective or non-Agilent lamp.	Exchange the lamp.
4 Defective VWM board	Please contact your Agilent service representative.
5 Defective power supply.	Please contact your Agilent service representative.

Lamp Voltage Missing

The lamp anode voltage is missing. The processor continually monitors the anode voltage across the lamp during operation. If the anode voltage falls below the lower limit, the error message is generated.

Probable cause	Suggested actions
1 Defective or non-Agilent lamp.	Exchange the lamp.
2 Defective power supply.	Please contact your Agilent service representative.
3 Defective VWM board	Please contact your Agilent service representative.

Lamp Ignition Failed

The lamp failed to ignite. The processor monitors the lamp current during the ignition cycle. If the lamp current does not rise above the lower limit within 2 – 5 seconds, the error message is generated.

Probable cause	Suggested actions
1 Lamp disconnected.	Ensure the lamp is connected.
2 Defective or non-Agilent lamp.	Exchange the lamp.
3 Defective power supply.	Please contact your Agilent service representative.
4 Defective VWM board	Please contact your Agilent service representative.

Heater Current Missing

The lamp heater current in the detector is missing. During lamp ignition, the processor monitors the heater current. If the current does not rise above the lower limit within one second, the error message is generated.

Probable cause	Suggested actions
1 Lamp disconnected.	Ensure the lamp is connected.
2 Ignition started without the top foam in place.	Replace the top foam, and turn on the lamp.
3 Defective VWM board	Please contact your Agilent service representative.
4 Defective or non-Agilent lamp.	Exchange the lamp.
5 Defective power supply.	Please contact your Agilent service representative.

Calibration Failed

The intensity maximum was not found during wavelength calibration.Calibration 0 Failed: Zero-order calibration failed.Calibration 1 Failed: 656 nm calibration failed. During zero-order and 656 nm calibration, the detector searches for the intensity maximum. If the maximum is not detected within the scan range, the error message is generated.

	Probable cause	Suggested actions
1	Lamp is OFF.	Switch on the lamp.
2	Incorrect flow cell installation.	Ensure the flow cell are installed correctly.
3	Flow cell contamination or air bubbles.	Clean/replace flow cell windows or remove air bubbles.
4	Intensity too low.	Replace lamp.
5	Current step value too far from maximum.	Enter a different calibration step value (different scan range). Repeat the calibration.
6	Misaligned/defective grating assembly.	Please contact your Agilent service representative.
7	Defective VWM board	Please contact your Agilent service representative.

Holmium Oxide Test Failed

The holmium oxide test in the detector has failed. During the holmium test, the detector moves the holmium filter into the light path, and compares the measured absorbance maxima of the holmium oxide filter with expected maxima. If the measured maxima are outside the limits, the error message is generated.

Probable cause	Suggested actions
1 Misaligned/defective grating assembly.	• Ensure the flow cell is inserted correctly, and is free from contamination (cell windows, buffers, and so on). • Run the filter-motor test to determine if the grating motor assembly is defective. If defective, please contact your Agilent service representative. • Run the grating-motor test to determine if the grating assembly is defective. If defective, please contact your Agilent service representative.

Grating/Filter Motor Test Failed

The motor test has failed.

test

- Test 0 Failed: Filter motor.
- Test 1 Failed: Grating motor.

During the motor tests, the detector moves the motor to the end position while monitoring the end-position sensor. If the end position is not found, the error message is generated.

Probable cause	Suggested actions
1 Defective motor assembly.	Please contact your Agilent service representative.

Wavelength Check Failed

The automatic wavelength check after lamp ignition has failed. When the lamp is switched on, the detector waits 1 minute to warm-up the lamp. Then a check of the deuterium emission line (656 nm) via the reference diode is performed. If the emission line is more than 3 nm away from 656 nm, the error message is generated.

Probable cause	Suggested actions
1 Calibration incorrect.	Recalibrate the detector.

Filter Check Failed

The automatic filter check after lamp ignition has failed. When the lamp is switched on, the detector moves the cutoff filter into the light path. If the filter is functioning correctly, a decrease in lamp intensity is seen. If the expected intensity decrease is not detected, the error message is generated.

Probable cause	Suggested actions
1 Filter motor defective.	Please contact your Agilent service representative.
2 Defective or missing filter.	Please contact your Agilent service representative.

Filter Missing

The filter motor is not detected.

Probable cause	Suggested actions
1 Filter motor is not connected.	Please contact your Agilent service representative.
2 Cable/connector defective.	Please contact your Agilent service representative.

Grating Missing

The grating motor is not detected.

Probable cause	Suggested actions
1 Grating motor is not connected.	Please contact your Agilent service representative.
2 Cable/connector defective.	Please contact your Agilent service representative.

ADC Hardware Error

A/D-Converter hardware is defective.

Probable cause	Suggested actions
1 A/D-Converter hardware is defective.	Please contact your Agilent service representative.

Illegal Value From Temperature Sensor

This temperature sensor delivered a value outside the allowed range. The parameter of this event equals the measured temperature in 1/100 centigrade. As a result the temperature control is switched off.

Probable cause	Suggested actions
1 Dirty or defective sensor.	Please contact your Agilent service representative. Links:
2 Detector is exposed to illegal ambient conditions.	Verify that the ambient conditions are within the allowed range.

Illegal Value From Air Inlet Temperature Sensor

This temperature sensor (located on the detector main board) delivered a value outside the allowed range. The parameter of this event equals the measured temperature in 1/100 centigrade. As a result the temperature control is switched off.

Probable cause	Suggested actions
1 The temperature sensor is defect.	Please contact your Agilent service representative.
2 Detector is exposed to illegal ambient conditions.	Verify that the ambient conditions are within the allowed range.

Heater Failed

Every time the deuterium lamp or the tungsten lamp is switched on or off a heater self-test is performed. If the test fails an error event is created. As a result the temperature control is switched off.

Probable cause	Suggested actions
1 Defective connector or cable.	Please contact your Agilent service representative.
2 Defective heater.	Please contact your Agilent service representative.

Heater Power At Limit

The available power of the heater reached either the upper or lower limit. This event is sent only once per run. The parameter determines which limit has been hit:

0 means upper power limit hit (excessive ambient temperature drop).

1 means lower power limit hit (excessive ambient temperature increase).

Probable cause	Suggested actions
1 Ambient conditions have changed too much during the run, so that optimum results may not be guaranteed.	• Verify that the reproducibility of your results is not affected. • Expose the detector to more stable ambient conditions.

No Run Data Available In Device

In a very rare case the capacity of the CompactFlash Card is not sufficient. This could happen for example when the interrupt of LAN communication takes longer and the detector uses special settings (e.g full data rate at 80 Hz plus full spectra plus all signals) during data buffering.

Probable cause	Suggested actions
1 CompactFlash Card is full.	• Correct communication problem. • Reduce data rate.

9
Test Functions

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This chapter describes the detector's built in test functions.

Intensity Test

The intensity test measures the intensity of the deuterium lamp over the full VWD wavelength range (190 - 600 nm). The test can be used to determine the performance of the lamp, and to check for dirty or contaminated flow cell windows. When the test is started, the gain is set to zero. To eliminate effects due to absorbing solvents, the test should be done with water in the flow cell. The shape of the intensity spectrum is primarily dependent on the lamp, grating, and diode characteristics. Therefore, intensity spectra will differ slightly between instruments. The figure below shows a typical intensity test spectrum.

The Intensity Test is available in

- Agilent Lab Advisor (preferred tool).
- Agilent Instant Pilot G4208A, via **More-Diagnosis-VWD-Lamp Intensity Test**.

Intensity Test Evaluation

The Agilent Lab Advisor and the Instant Pilot evaluate three values automatically and display the limits for each value, the average, the minimum and the maximum of all data points and **passed** or **failed** for each value.

Instensity Test with Agilent LabAdvisor

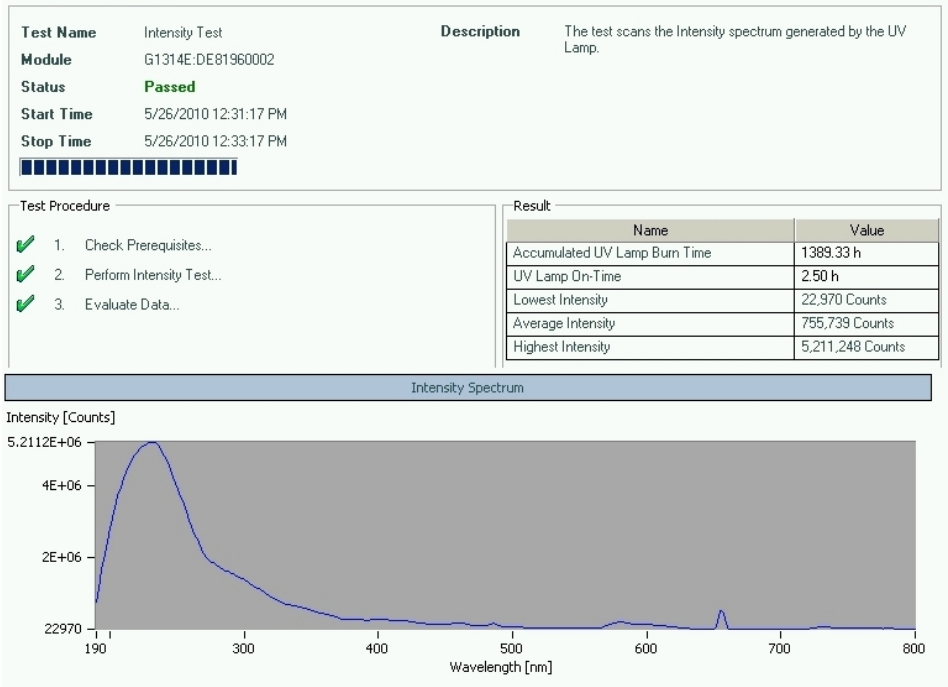


Figure 58 Intensity Test with Agilent LabAdvisor

Intensity Test Failed

Probable cause	Suggested actions
1 Empty flow cell	Ensure the flow cell is filled with water.
2 Flow cell windows dirty	Repeat the test with the flow cell removed. If the test passes, exchange the flow cell windows.
3 Optics defect	Clean/replace optical components.
4 Defective lamp or optics.	Exchange the lamp.

Checking the Photocurrent

To identify problems with the flow cell (contaminated windows, air bubbles and so on) you can use raw data from the sample and reference photodiode (unfiltered and not logarithmic).

The photocurrent information (RAW SAMPLE/REFERENCE) is available in

- Agilent Lab Advisor (preferred tool).
- Agilent Instant Pilot G4208A, via **More-Diagnosis-VWD-LampIntensity Test**.

Photocurrent Evaluation

With a clean cell the counts for sample and reference are in the same range. If the sample side shows much lower values than the reference side the flow cell might have a problem due to

- ✔ dirty windows,
- ✔ absorbing solvents/compounds,
- ✔ not correctly mounted flow cell, or
- ✔ air bubbles

Checking the Photocurrent with the Instant Pilot

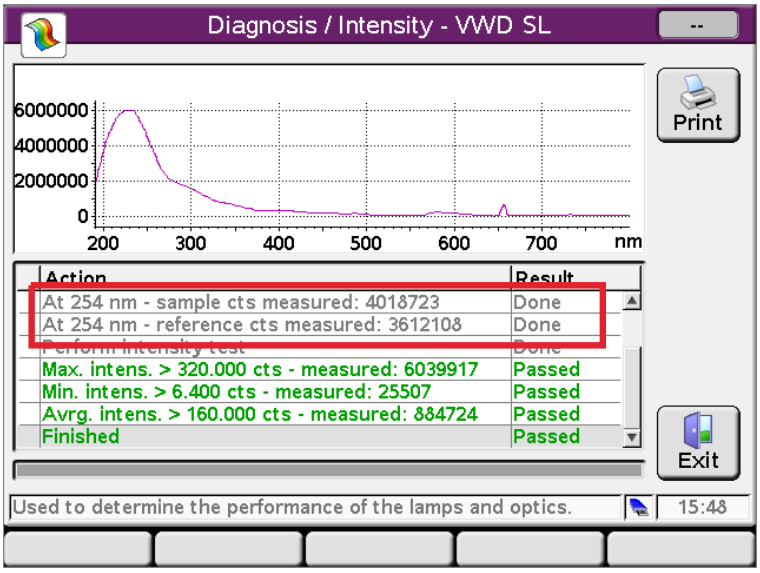


Figure 59 Checking the Photocurrent with the Instant Pilot

Wavelength Verification-Calibration

Wavelength calibration of the detector is done using the zero-order position and 656 nm emission line position of the deuterium lamp. The calibration procedure involves two steps. First the grating is calibrated on the zero-order position. The stepper-motor step position where the zero-order maximum is detected is stored in the detector. Next, the grating is calibrated against the deuterium emission-line at 656 nm, and the motor position at which the maximum occurs is stored in the detector.

In addition to the zero-order and 656 nm (alpha-emission line) calibration, the beta-emission line at 486 nm and the three holmium lines are used for the complete wavelength calibration process. These holmium lines are at 360.8 nm, 418.5 nm and 536.4 nm.

NOTE The wavelength verification/calibration takes about 2.5 min and is disabled within the first 10 min after ignition of the lamp because initial drift may distort the measurement.

When the lamp is turned **ON**, the 656 nm emission line position of the deuterium lamp is checked automatically.

The Wavelength Verification/Calibration is available in

- Agilent Lab Advisor (preferred tool).
- Agilent Instant Pilot G4208A, via **More-Diagnosis-VWD-Calibration**.

When to Calibrate the Detector

The detector is calibrated at the factory, and under normal operating conditions should not require recalibration. However, it is advisable to recalibrate:

- after maintenance (flow cell or lamp),
- after repair of components in the optical unit,
- after exchange of the optical unit or VWM board,
- at a regular interval, at least once per year (for example, prior to an Operational Qualification/Performance Verification procedure), and

- when chromatographic results indicate the detector may require recalibration.

Wavelength Verification/Calibration with Agilent LabAdvisor

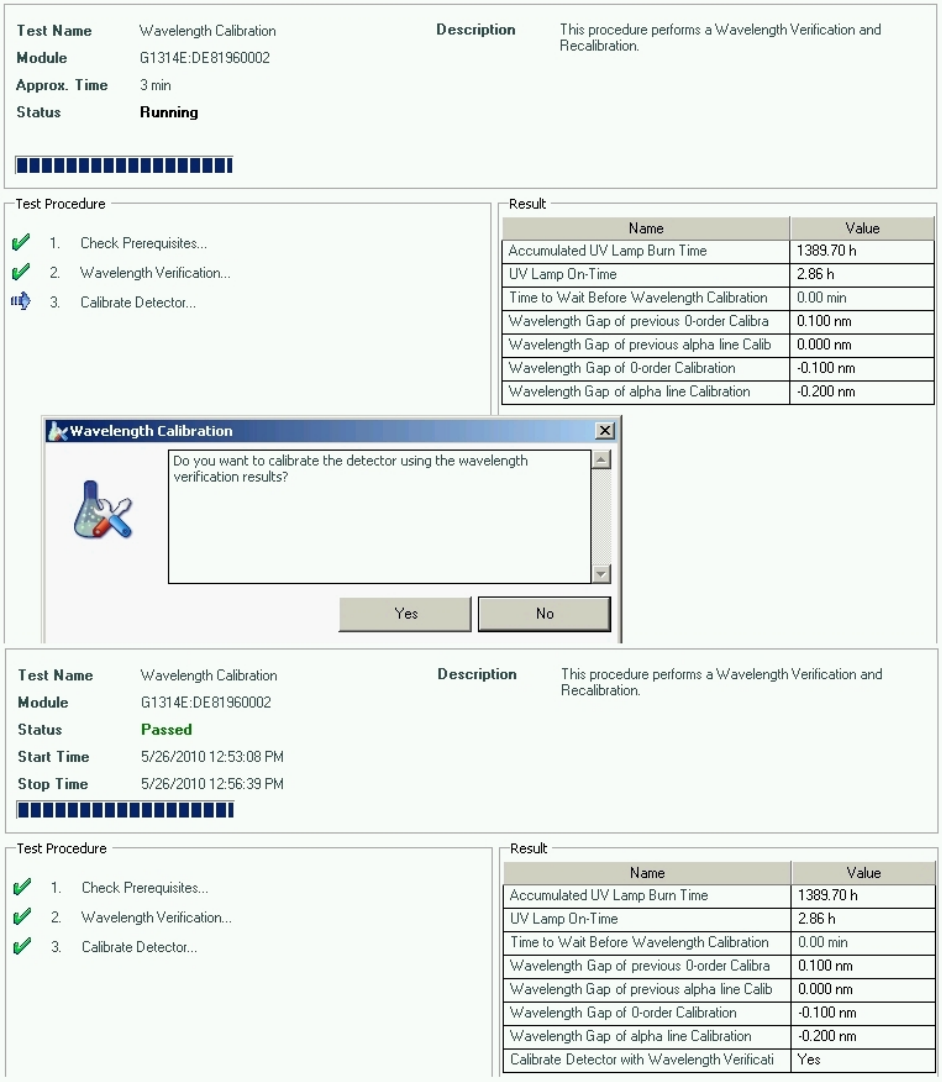

Test Name Wavelength Calibration
Module G1314E:DE81960002
Approx. Time 3 min
Status Running
Description This procedure performs a Wavelength Verification and Recalibration.
Test Procedure
1. Check Prerequisites...
2. Wavelength Verification...
3. Calibrate Detector...
Result
Name | Value
Accumulated UV Lamp Burn Time | 1389.70 h
UV Lamp On-Time | 2.86 h
Time to Wait Before Wavelength Calibration | 0.00 min
Wavelength Gap of previous 0-order Calibra | 0.100 nm
Wavelength Gap of previous alpha line Calib | 0.000 nm
Wavelength Gap of 0-order Calibration | -0.100 nm
Wavelength Gap of alpha line Calibration | -0.200 nm
Wavelength Calibration
Do you want to calibrate the detector using the wavelength verification results?
Yes
No
Test Name Wavelength Calibration
Module G1314E:DE81960002
Status Passed
Start Time 5/26/2010 12:53:08 PM
Stop Time 5/26/2010 12:56:39 PM
Description This procedure performs a Wavelength Verification and Recalibration.
Test Procedure
1. Check Prerequisites...
2. Wavelength Verification...
3. Calibrate Detector...
Result
Name | Value
Accumulated UV Lamp Burn Time | 1389.70 h
UV Lamp On-Time | 2.86 h
Time to Wait Before Wavelength Calibration | 0.00 min
Wavelength Gap of previous 0-order Calibra | 0.100 nm
Wavelength Gap of previous alpha line Calib | 0.000 nm
Wavelength Gap of 0-order Calibration | -0.100 nm
Wavelength Gap of alpha line Calibration | -0.200 nm
Calibrate Detector with Wavelength Verificati | Yes

Figure 60 Wavelength Verification/Calibration with Agilent LabAdvisor

ASTM Drift and Noise Test

The ASTM Drift and Noise test determines the detector noise over a period of 20 minutes. The test is done with HPLC-grade water flowing through the flow cell at 1 mL/min. On completion of the test, the noise result is displayed automatically.

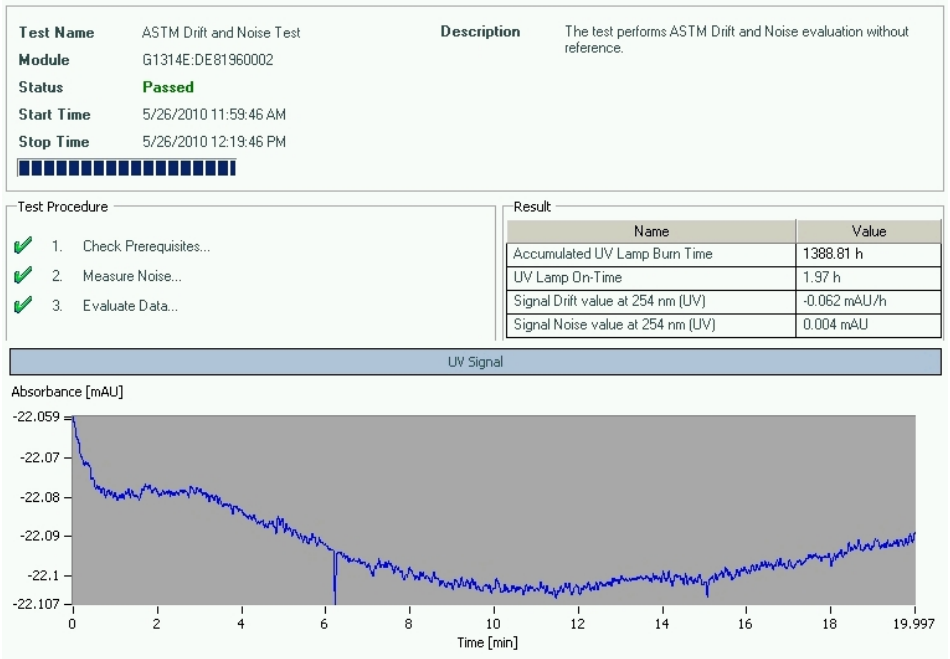


Figure 61 ASTM Drift and Noise Test with Agilent LabAdvisor

Quick Noise Test

The noise test measures the noise of the detector, with HPLC-grade water flowing through the flow cell at 1 mL/min, in one minute intervals over a total of 5 minutes.

The noise of the detector is calculated by using the maximum amplitude for all random variations of the detector signal of frequencies greater than one cycle per hour. The noise is determined for 5 one minute intervals and is based on the accumulated peak-to-peak noise for the intervals. At least seven data points per cycles are used in the calculation.

The cycles in the noise determination are not overlapping.

In order to obtain reliable results, the lamp should be turned on for at least 10 minutes prior to measurement.

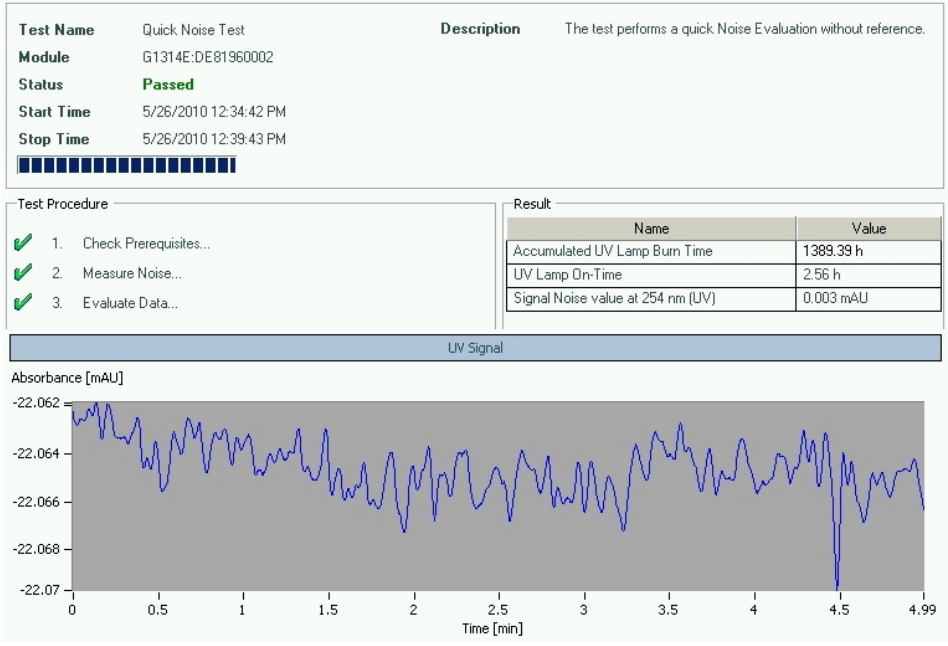


Figure 62 Quick Noise Test with Agilent LabAdvisor

Holmium Oxide Test

This test verifies the calibration of the detector against the three wavelength maxima of the built-in holmium oxide filter. The test displays the difference between the expected and measured maxima. The figure below shows a holmium test spectrum.

The Holmium Oxide Test is available in

- Agilent Lab Advisor (preferred tool).
- Agilent Instant Pilot G4208A, via **More-Diagnosis-VWD-Holmium Spectrum Test**.

The test uses the following holmium maxima:

- 360.8 nm
- 418.5 nm
- 536.4 nm

NOTE See also "Holmium Declaration (UV-Detectors)" "Declaration of Conformity for HOX2 Filter" on page 220.

When to do the Test

- after recalibration,
- as part of the Operational Qualification/Performance Verification procedure, or
- after flow cell maintenance or repair.

Interpreting the Results

The test is passed successfully when all three wavelengths are within ± 1 nm of the expected value. This indicates the detector is calibrated correctly.

Holmium Oxide Test with Agilent LabAdvisor

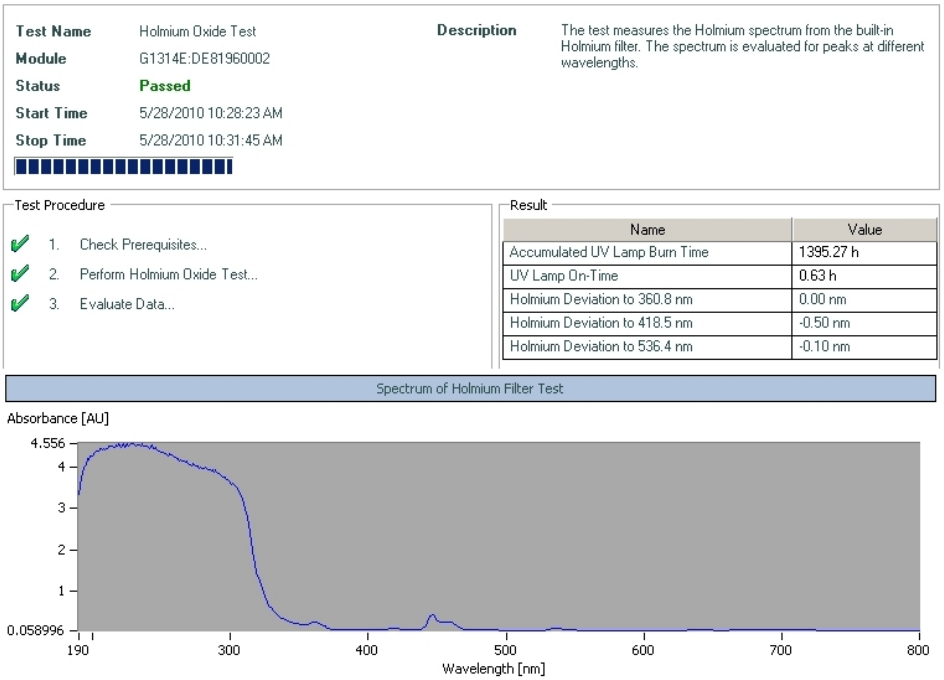


Figure 63 Holmium Oxide Test with Agilent LabAdvisor

Test Chromatogram

This function is available from the Agilent ChemStation, LabAdvisor and Instant Pilot.

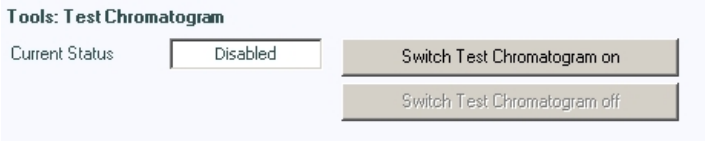
The built-in Test Chromatogram can be used to check the signal path from the detector to the data system and the data analysis or via the analog output to the integrator or data system. The chromatogram is continuously repeated until a stop is executed either by means of a stop time or manually.

NOTE The peak height is always the same but the area and the retention time depend on the set peakwidth, see examples below.

Procedure Using the Agilent LabAdvisor

This procedure works for all Agilent 1200 Infinity detectors (DAD, MWD, VWD, FLD and RID). The example figure is from the RID detector.

1. Assure that the default LC method is loaded via the control software.
2. Start the Agilent LabAdvisor software (B.01.03 SP4 or later) and open the detector's **Tools** selection.
3. Open the test chromatogram screen



4. Turn the **Test Chromatogram** on.
5. Change to the detector's **Module Service Center** and add the detector signal to the Signal Plot window.

6 To start a test chromatogram enter in the command line: STRT

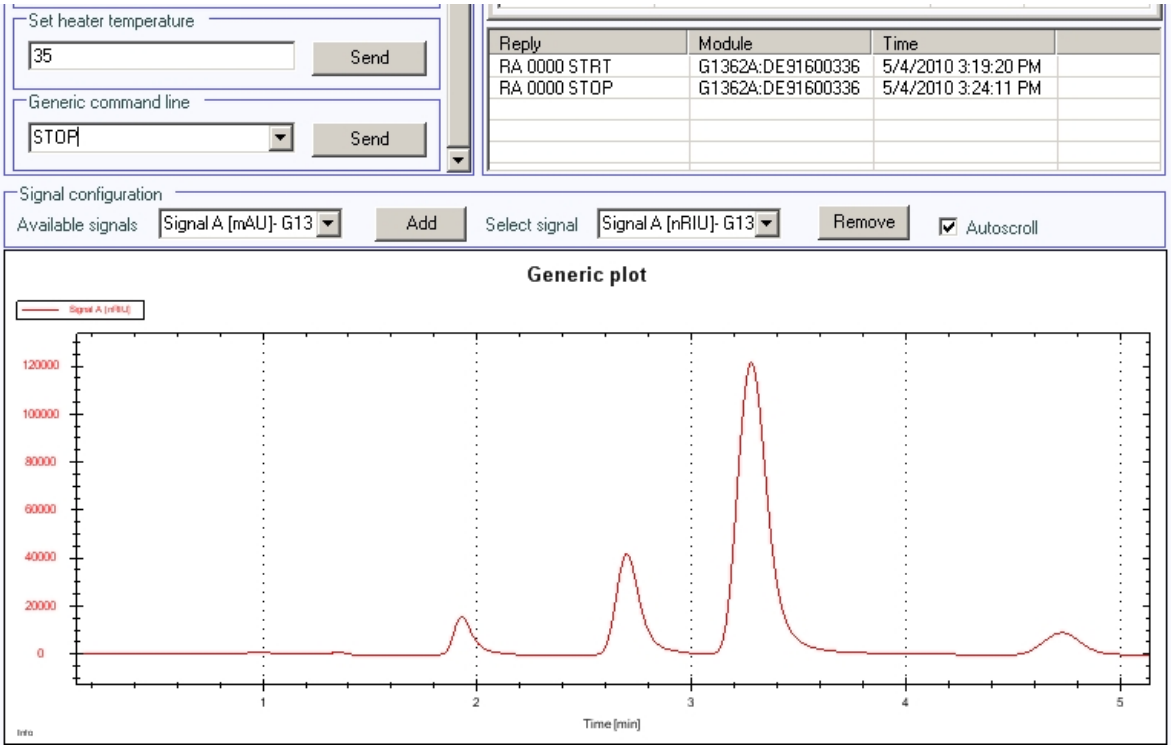


Figure 64 Test Chromatogram with Agilent LabAdvisor

7 To stop the test chromatogram enter in the command line: STOP

NOTE The test chromatogram is switched off automatically at the end of a run.

10
Maintenance and Repair

Introduction to Maintenance 164
Warnings and Cautions 165
Overview of Maintenance 167
Cleaning the Module 168
Exchanging a Lamp 169
Exchanging a Flow Cell 172
Repairing the Flow Cells 175
Using the Cuvette Holder 178
Correcting Leaks 180
Replacing Leak Handling System Parts 181
Replacing the Module's Firmware 182

This chapter provides general information on maintenance and repair of the detector.

Introduction to Maintenance

The module is designed for easy maintenance. The most frequent maintenances such as lamp change and flow cell change can be done from the front with module in place in the system stack.

NOTE

There are no serviceable parts inside.

Do not open the module.

Warnings and Cautions

WARNING

Toxic, flammable and hazardous solvents, samples and reagents

The handling of solvents, samples and reagents can hold health and safety risks.

➔ When working with these substances observe appropriate safety procedures (for example by wearing goggles, safety gloves and protective clothing) as described in the material handling and safety data sheet supplied by the vendor and follow good laboratory practice.

➔ The amount of substances should be reduced to the minimal volume required for the analysis.

➔ Do not operate the instrument in an explosive atmosphere.

WARNING

Eye damage by detector light

Eye damage may result from directly viewing the UV-light produced by the lamp of the optical system used in this product.

➔ Always turn the lamp of the optical system off before removing it.

WARNING

Electrical shock

Repair work at the module can lead to personal injuries, e.g. shock hazard, when the cover is opened.

➔ Do not remove the metal top cover of the module. No serviceable parts inside.

➔ Only certified persons are authorized to carry out repairs inside the module.

WARNING

Personal injury or damage to the product

Agilent is not responsible for any damages caused, in whole or in part, by improper use of the products, unauthorized alterations, adjustments or modifications to the products, failure to comply with procedures in Agilent product user guides, or use of the products in violation of applicable laws, rules or regulations.

➔ Use your Agilent products only in the manner described in the Agilent product user guides.

CAUTION

Safety standards for external equipment

➔ If you connect external equipment to the instrument, make sure that you only use accessory units tested and approved according to the safety standards appropriate for the type of external equipment.

Overview of Maintenance

The following pages describe maintenance (simple repairs) of the detector that can be carried out without opening the main cover.

Table 31 Simple Repairs

Procedures	Typical Frequency	Notes
Deuterium lamp exchange	If noise and/or drift exceeds your application limits or lamp does not ignite.	A VWD test should be performed after replacement.
Flow cell exchange	If application requires a different flow cell type.	A VWD test should be performed after replacement.
Cleaning flow cell parts cleaning or exchange	If leaking or if intensity drops due to contaminated flow cell windows.	A pressure tightness test should be done after repair.
Leak sensor drying	If leak has occurred.	Check for leaks.
Leak handling system replacement	If broken or corroded.	Check for leaks.

Cleaning the Module

The module case should be kept clean. Cleaning should be done with a soft cloth slightly dampened with water or a solution of water and mild detergent. Do not use an excessively damp cloth as liquid may drip into the module.

WARNING

Liquid dripping into the electronic compartment of your module.

Liquid in the module electronics can cause shock hazard and damage the module.

➔ Do not use an excessively damp cloth during cleaning.

➔ Drain all solvent lines before opening any fittings.

Exchanging a Lamp

When If noise or drift exceeds application limits or lamp does not ignite.

Tools required Screwdriver POZI 1 PT3

Parts required

#	p/n	Description
1	G1314-60101	Deuterium lamp (with RFID tag)
1		or other Agilent recommended lamps

Preparations Turn the lamp OFF.

NOTE If you want to use an Agilent DAD lamp instead of the VWD lamp, you have to change the lamp settings in the *VWD Configuration* to the required lamp type. This ensures that the DAD lamp's filament heating is operated like in the DAD.

NOTE The specification are based on the the standard RFID tag lamp (G1314-60101) and may be not achieved when other lamp types or aged lamps are used.

WARNING

Injury by touching hot lamp

If the detector has been in use, the lamp may be hot.

➔ If so, wait for lamp to cool down.

WARNING

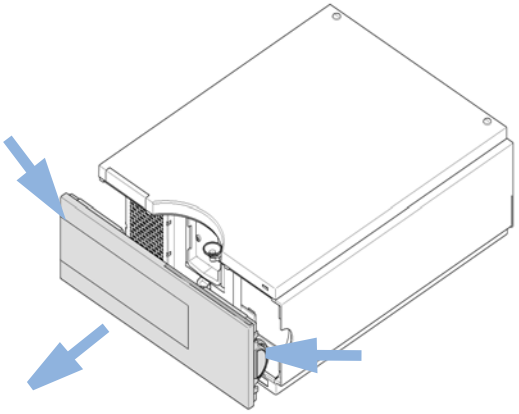
Injury by sharp metal edges

➔ Be careful when touching the RFI sheet metal at the rear of the fan. There are sharp edges.

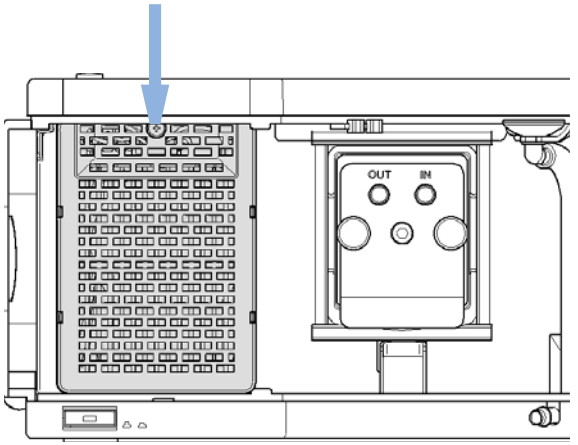
CAUTION Electronic boards and components are sensitive to electrostatic discharge (ESD).

➔ To prevent accidental electrostatic discharge when coming into contact with components inside the instrument, touch one of the metal housing panels at the front of the instrument.

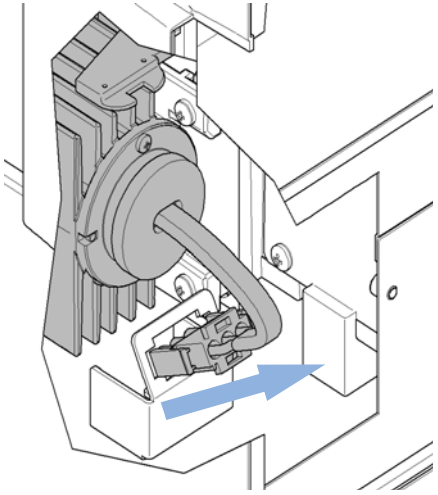
1 Press the release buttons and remove the front cover to have access to the front area.



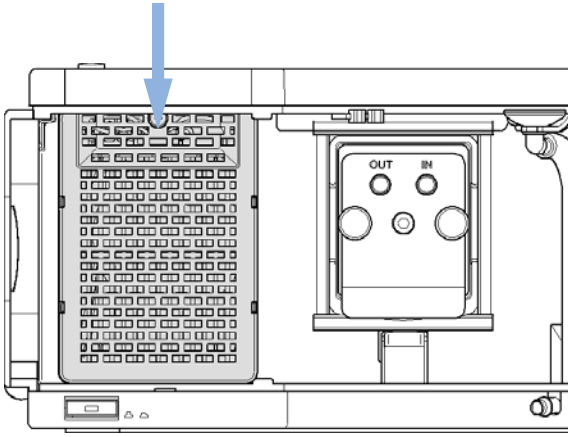
2 Unscrew the heater assembly and remove it.



3 Unscrew, disconnect and remove the lamp. Insert, fix and reconnect the lamp.



4 Replace the heater assembly.



Next Steps:

5 Replace the front cover.

6 Reset the lamp counter as described in the User Interface documentation (required for non-RFID tag lamps only).

7 Turn the lamp ON.

8 Give the lamp more than 10 minutes to warm-up.

9 Perform "Wavelength Verification-Calibration" on page 154 to check the correct positioning of the lamp.

NOTE If the detector was turned off during the replacement, then the detector requires a warm-up time of 60 minutes. No measurements should be performed during this time.

Exchanging a Flow Cell

When If application needs a different type of flow cell or the flow cell needs repair.

Tools required Two 1/4 inch wrenches for capillary connections

Parts required

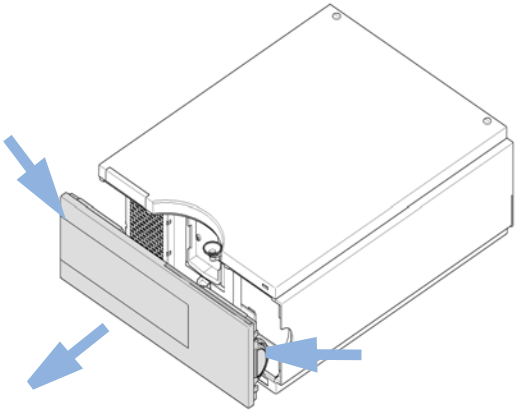
#	Description
1	Flow cell

For flow cell details see

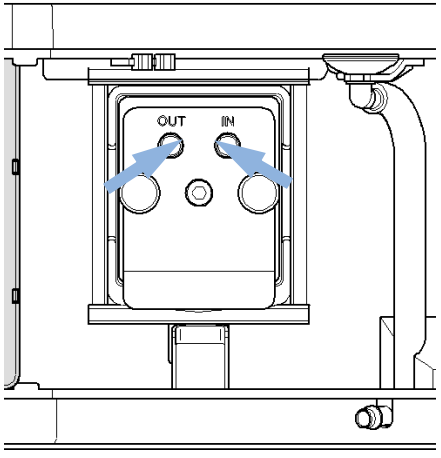
- “Standard Flow Cell 10 mm / 14 µl” on page 188
- “Micro Flow Cell 3 mm / 2 µl” on page 190
- “Semi-micro Flow Cell 6 mm / 5 µl” on page 192
- “High Pressure Flow Cell 10 mm / 14 µl” on page 194

Preparations Turn the lamp OFF.

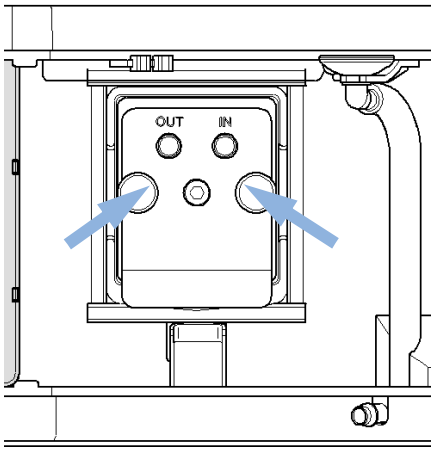
1 Press the release buttons and remove the front cover to have access to the flow cell area.



2 Disconnect the inlet and outlet capillaries.



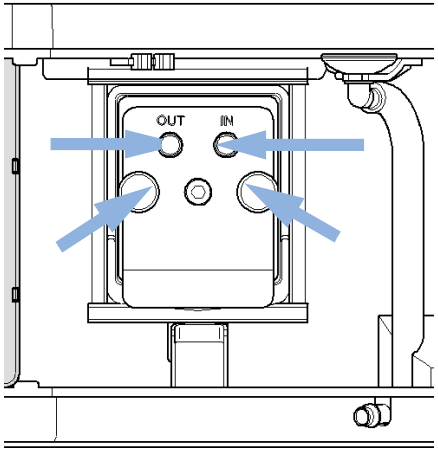
3 Unscrew the thumb screws parallel and remove the flow cell.



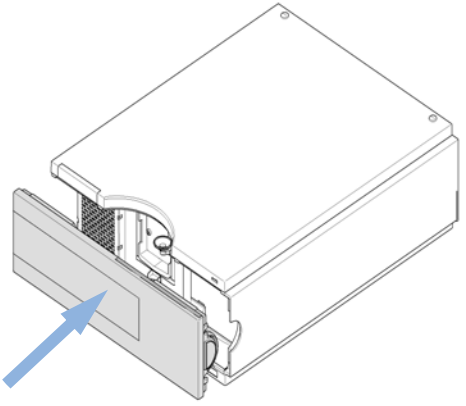
NOTE

If you want to maintain flow cell parts, see "Overview of Maintenance Parts" on page 186 or the information provided with your flow cell.

4 Replace the flow cell and fix the thumb screws. Reconnect the inlet and outlet capillaries to the flow cell.



5 Replace the front cover.



Next Steps:

6 To check for leaks, establish a flow and observe the flow cell (outside of the cell compartment) and all capillary connections.

7 Insert the flow cell.

8 Perform "Wavelength Verification-Calibration" on page 154 to check the correct positioning of the flow cell.

9 Replace the front cover.

Repairing the Flow Cells

Parts required

#	Description
1	Flow cell

For details on flow cells see

- “Standard Flow Cell 10 mm / 14 µl” on page 188
- “Micro Flow Cell 3 mm / 2 µl” on page 190
- “Semi-micro Flow Cell 6 mm / 5 µl” on page 192
- “High Pressure Flow Cell 10 mm / 14 µl” on page 194

NOTE The shown cell parts will differ depending upon the flow cell type. For detailed parts schematics, refer to above mentioned pages.

1 - Cell screw
2 - Conical springs
3 - Ring #1 PEEK
4 - Gasket #1 (small hole)
5 - Window Quartz
6 - Gasket #2 (large hole)
7 - Ring #2 PEEK
8 - RFID tag

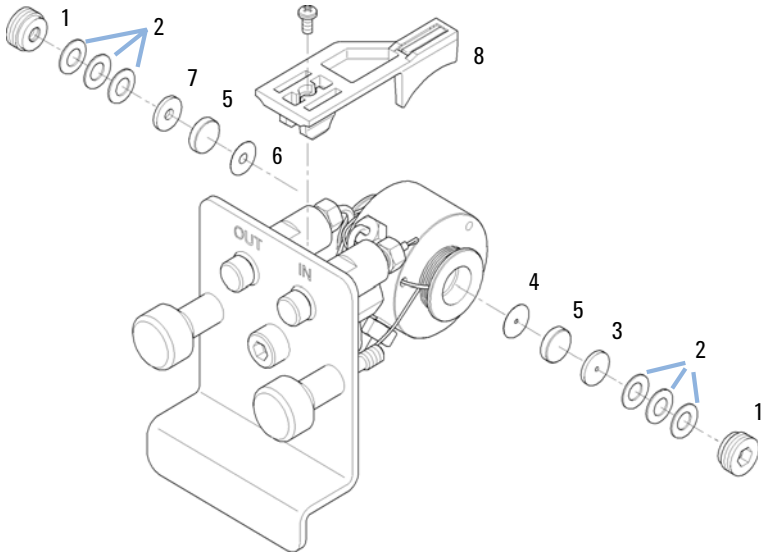


Figure 65 Standard Flow Cell

1 Disassembling the Flow Cell.

a Unscrew the cell screw using a 4-mm hexagonal wrench.

b Remove the SST rings using a pair of tweezers.

CAUTION

Scratched window surfaces by tweezers

Window surfaces can easily be scratched by using tweezers for removing the windows.

➔ Do not use tweezers to remove windows

c Use adhesive tape to remove the peek ring, the window and the gasket.

d Repeat step 1 through step 3 for the other window (keep the parts separate - otherwise they could be mixed!).

2 Cleaning the Flow Cell Parts

a Pour isopropanol into the cell hole and wipe clean with a piece of lint-free cloth.

b Clean the windows with ethanol or methanol. Dry it with a piece of lint-free cloth.

NOTE Always use new gaskets.

3 Reassembling the Flow Cell

a Hold the flow cell cassette horizontally and place gasket in position. Ensure both cell holes can be seen through the holes of gasket.

NOTE The semi-micro #1 and #2 gaskets (items 6 and 7, "Semi-micro Flow Cell 6 mm / 5 µl" on page 192) look very similar. Do not mix them up.

b Place the window on gasket.

c Place the peek ring on the window.

d Insert the conical springs. Make sure the conical springs point towards the window. Otherwise tightening the cell screw might break the window.

e Screw the cell screw into the flow cell and tighten the screw.

4 Repeat the procedure for the other cell side.

5 Reconnect the capillaries.

6 Perform a leak test. If OK, insert the flow cell.

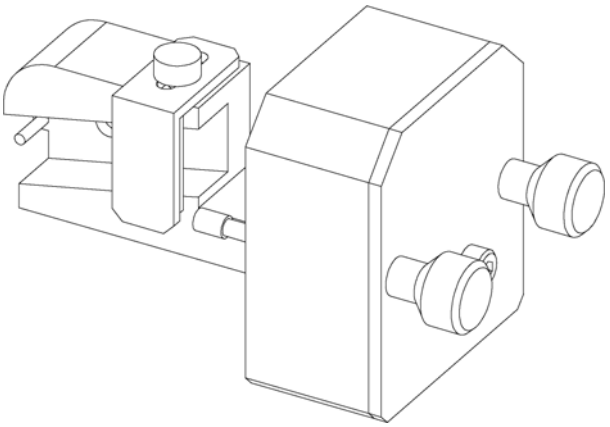
7 Perform "Wavelength Verification-Calibration" on page 154 to check the correct positioning of the flow cell.

8 Replace the front cover.

Using the Cuvette Holder

This cuvette holder can be placed instead of a flow cell in the variable wavelength detector. Standard cuvettes with standards in it, for example, National Institute of Standards & Technology (NIST) holmium oxide solution standard, can be fixed in it.

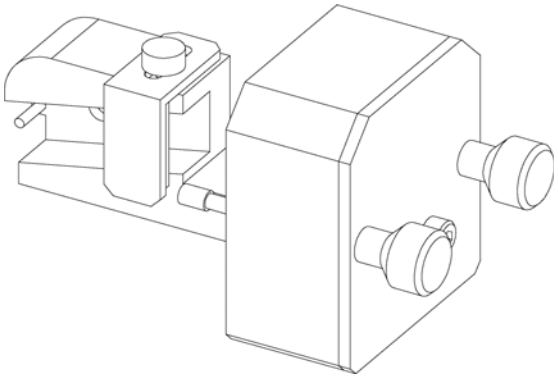
This can be used for wavelength verifications.



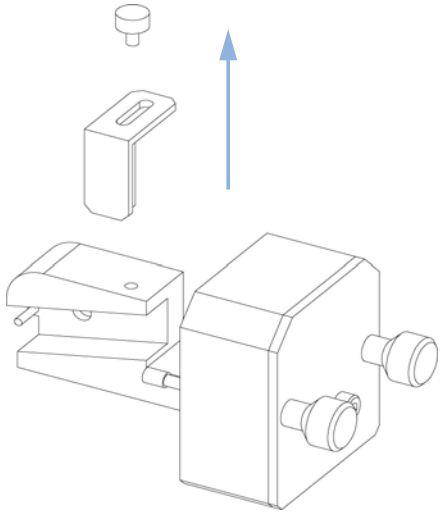
Parts required

#	p/n	Description
1	G1314-60200	Cuvette Holder
1		Cuvette with the “standard”, e.g. NIST certified holmium oxide sample

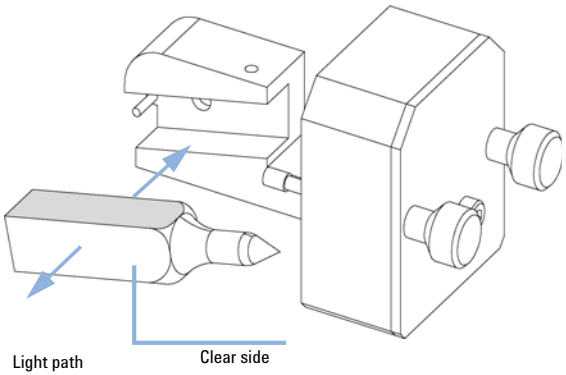
1 Locate the cuvette holder on the desk.



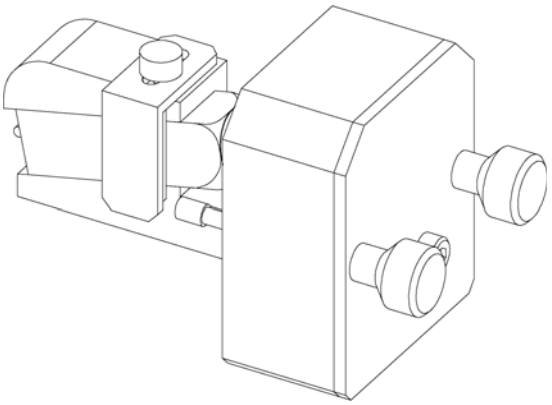
2 Unscrew the bracket.



3 Insert the cuvette with the sample into the holder. The clear side of the cuvette must be visible.



4 Replace the bracket and fix the cuvette.



Next Steps:

5 Install the cuvette holder in the instrument.

6 Perform your Wavelength Verification/Calibration "Wavelength Verification-Calibration" on page 154 to check the correct position of the cuvette holder.

Correcting Leaks

When If a leakage has occurred in the flow cell area or at the capillary connections.

Tools required Tissue
Two 1/4 inch wrenches for capillary connections

1. Remove the front cover.
2. Use tissue to dry the leak sensor area.
3. Observe the capillary connections and the flow cell area for leaks and correct, if required.
4. Replace the front cover.

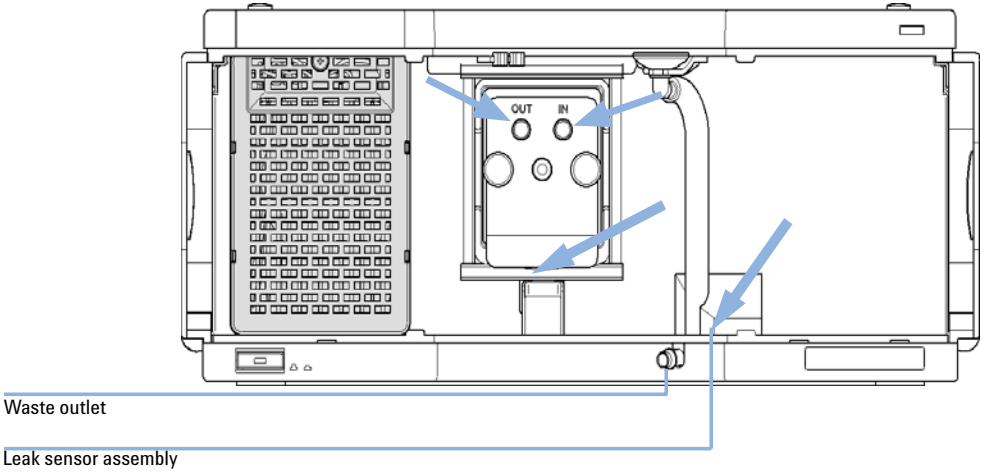


Figure 66 Drying the Leak Sensor

Replacing Leak Handling System Parts

When If the parts are corroded or broken.

Tools required None

Parts required

#	p/n	Description
1	5041-8389	Leak funnel holder
1	5061-3356	Leak funnel
1	5062-2463	Tubing Flex 5 m

1 Remove the front cover to have access to the leak handling system.
2 Pull the leak funnel out of the leak funnel holder.
3 Pull the leak funnel with the tubing out of its location.
4 Replace the leak funnel and/or the tubing.
5 Insert the leak funnel with the tubing in its position.
6 Insert the leak funnel into the leak funnel holder.
7 Replace the front cover.

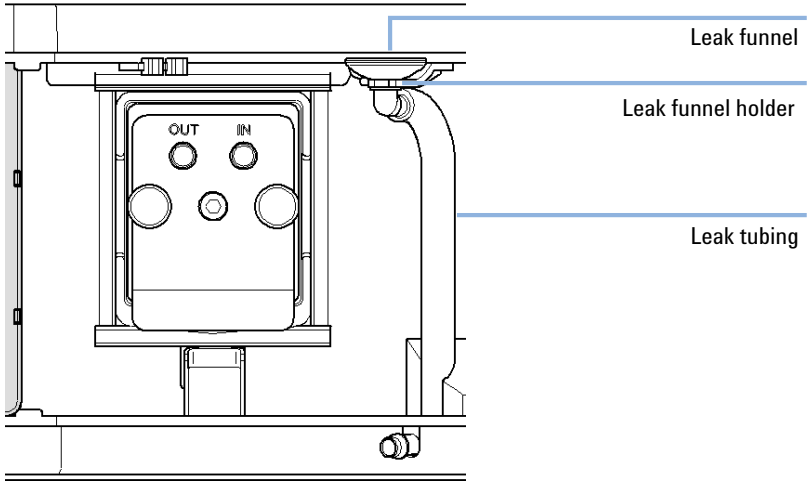


Figure 67 Replacing Waste Handling System Parts

Replacing the Module's Firmware

When

The installation of newer firmware might be necessary
- if a newer version solves problems of older versions or
- to keep all systems on the same (validated) revision.

The installation of older firmware might be necessary
- to keep all systems on the same (validated) revision or
- if a new module with newer firmware is added to a system or
- if third part control software requires a special version.

Tools required

- LAN/RS-232 Firmware Update Tool or
- Agilent Diagnostic Software
- Instant Pilot G4208A (only if supported by module)

Parts required

#	Description
1	Firmware, tools and documentation from Agilent web site

Preparations

Read update documentation provided with the Firmware Update Tool.

To upgrade/downgrade the module's firmware carry out the following steps:

1 Download the required module firmware, the latest LAN/RS-232 FW Update Tool and the documentation from the Agilent web.
   - http://www.chem.agilent.com/scripts/cag_firmware.asp.

2 To load the firmware into the module follow the instructions in the documentation.

Module Specific Information

Table 32 Module Specific Information

	G1314D	G1314E	G1314F
Initial firmware	B.06.20	B.06.20	B.06.30
Compatibility with 1100 / 1200 series modules	When using the G1314D in a system, all other modules must have firmware revision A.06.10 or B.06.10 or above (main and resident). Otherwise the communication will not work.	When using the G1314E in a system, all other modules must have firmware revision A.06.10 or B.06.10 or above (main and resident). Otherwise the communication will not work.	When using the G1314F in a system, all other modules must have firmware revision A.06.30 or B.06.30 or above (main and resident). Otherwise the communication will not work.
Conversion to / emulation of G1314B or G1314C	Not possible due to different hardware and electronic platform		

11
Parts and Materials for Maintenance

Overview of Maintenance Parts 186
Standard Flow Cell 10 mm / 14 µl 188
Micro Flow Cell 3 mm / 2 µl 190
Semi-micro Flow Cell 6 mm / 5 µl 192
High Pressure Flow Cell 10 mm / 14 µl 194
Cuvette Holder 196
Accessory Kit 197

This chapter provides information on parts for maintenance.

Overview of Maintenance Parts

p/n	Description
5181-1516	CAN cable, Agilent module to module, 0.5 m
5181-1519	CAN cable, Agilent module to module, 1 m
G1314-60101	Deuterium lamp (with RFID tag)
G1314-60186	Standard flow cell 10 mm, 14 µL (with RFID tag)
G1314-60187	Micro flow cell 3 mm, 2 µL (with RFID tag)
G1314-60183	Semi-micro flow cell 6 mm, 5 µL (with RFID tag)
G1314-60182	High pressure flow cell 10 mm, 14 µL (with RFID tag)
G1314-60200	Cuvette Holder
5067-4691	Front cover 1260 (G1314F)
5067-4618	Front cover 1290 (G1314E)
5065-9982	Front cover 1200 (G1314D)

For details on flow cells, refer to

- “Standard Flow Cell 10 mm / 14 µl” on page 188,
- “Micro Flow Cell 3 mm / 2 µl” on page 190,
- “Semi-micro Flow Cell 6 mm / 5 µl” on page 192 and
- “High Pressure Flow Cell 10 mm / 14 µl” on page 194.

Standard Flow Cell 10 mm / 14 µl

Item	p/n	Description
	G1314-60186	Standard flow cell 10 mm, 14 µL (with RFID tag)
	5062-8522	Capillary column - detector PEEK 600 mm lg, 0.17 mm i.d., 1/16 inch o.d.
	G1314-65061	Cell Repair Kit, includes 2x Gasket #1, 2x Gasket #2, 2x Window Quartz
1	G1314-65062	Cell screw kit
2	79853-29100	Conical spring kit
3	G1314-65065	Ring #1 PEEK kit
4	G1314-65063	Gasket #1 (small hole, i.d. 1 mm, o.d. 7.9 mm), KAPTON
5	79853-68742	Window quartz kit
6	G1314-65064	Gasket #2 (large hole, i.d. 2.4 mm, o.d. 7.9 mm), KAPTON
7	G1314-65066	Ring #2 PEEK kit
8	G1314-44010	Clip for RFI ID tag
9	0515-4780	Screw for Clip, M2.2, 4.5 mm long

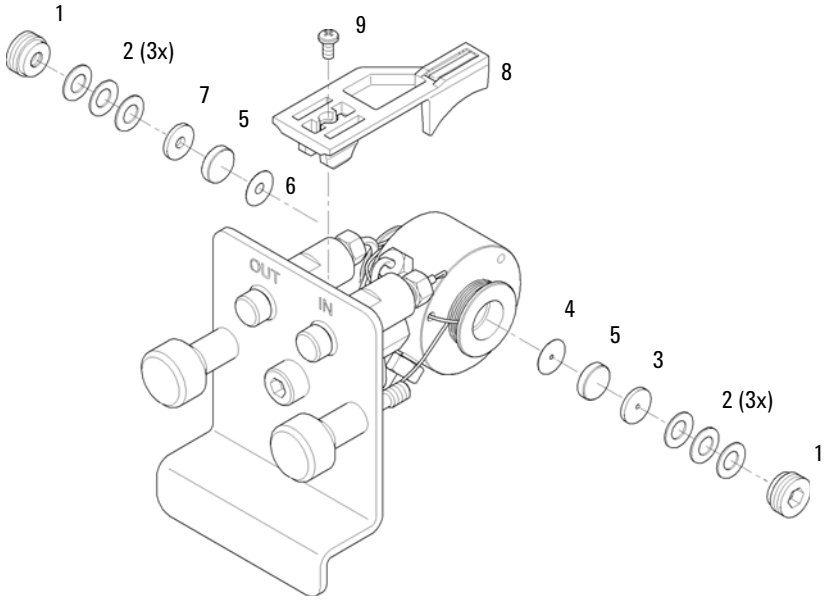


Figure 68 Standard Flow Cell

Micro Flow Cell 3 mm / 2 µl

Item	p/n	Description
	G1314-60187	Micro flow cell 3 mm, 2 µL (with RFID tag)
	5021-1823	Capillary column – detector SST 400 mm lg, 0.12 mm i.d.
1	79883-22402	Window screw
2	5062-8553	Spring washers
3	79883-28801	Compression washer
4	79883-22301	Window holder
5	1000-0488	Quartz window
6		Gasket BACK (Teflon), 1.8 mm hole, outlet side, part of Gasket BACK (Teflon), 1.8 mm hole, outlet side (12/pk) (p/n 79883-68702)
7		Gasket Front (Teflon), 1.3 mm hole, inlet side, part of Gasket FRONT (Teflon), 1.3 mm hole, inlet side (12/pk) (p/n G1315-68710)
8	G1314-44010	Clip for RFI ID tag
9	0515-4780	Screw for Clip, M2.2, 4.5 mm long
	G1314-87301	Capillary IN (0.12 mm, 310 mm lg)
	G1314-87302	Capillary OUT (0.17 mm, 120 mm lg)
	G1315-68713	Cell repair kit semi-micro, includes window screw kit, 4 mm hexagonal wrench and seal kits
	79883-68702	Gasket BACK (Teflon), 1.8 mm hole, outlet side (12/pk)
	G1315-68710	Gasket FRONT (Teflon), 1.3 mm, inlet side (12/pk)
	79883-68703	Window screw kit, includes 2 quartz windows, 2 compression washers, 2 window holders, 2 window screws and 10 spring washers

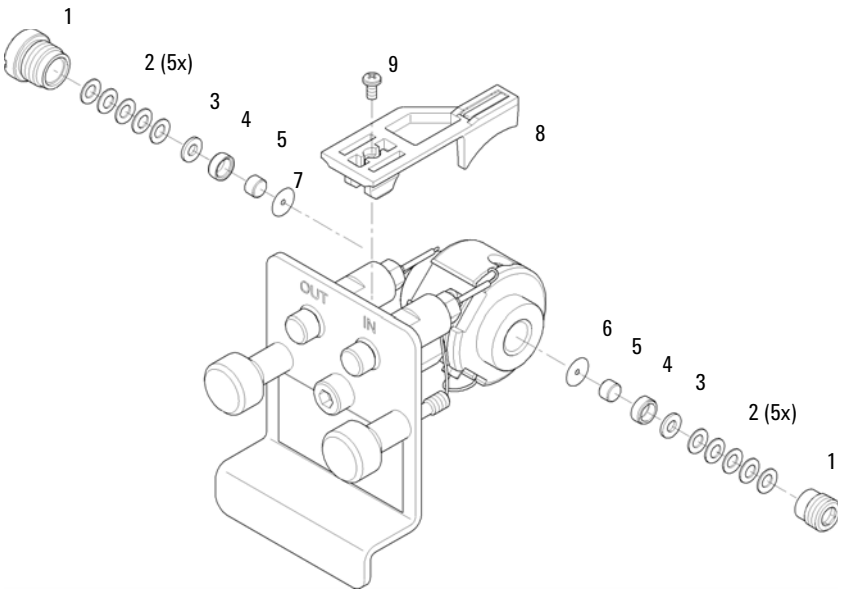


Figure 69 Micro Flow Cell

Semi-micro Flow Cell 6 mm / 5 µl

NOTE The semi-micro #1 and #2 gaskets (items 6 and 7) look very similar. Do not mix them up.

Item	p/n	Description
	G1314-60183	Semi-micro flow cell 6 mm, 5 µL (with RFID tag)
1	79853-27200	Cell screw
	G1314-65056	Semi-micro cell kit, consisting of: two windows, two #1 standard gaskets, one #1 semi-micro gasket and one #2 semi-micro gasket.
2	79853-29100	Conical spring kit
3	79853-22500	Ring SST, (pack of 2)
4	79853-68743	PTFE #1 standard gasket (round hole i.d. 2.5 mm, o.d. 8 mm), (pack of 10)
5	79853-68742	Window quartz kit
6		Semi-micro #1 gasket (long hole 1.5 x 3.5 mm), PTFE
7		Semi-micro #2 gasket (long hole 2 x 4 mm), PTFE
	5021-1823	Capillary column – detector SST 400 mm lg, 0.12 mm i.d.
8	G1314-44010	Clip for RFI ID tag
9	0515-4780	Screw for Clip, M2.2, 4.5 mm long

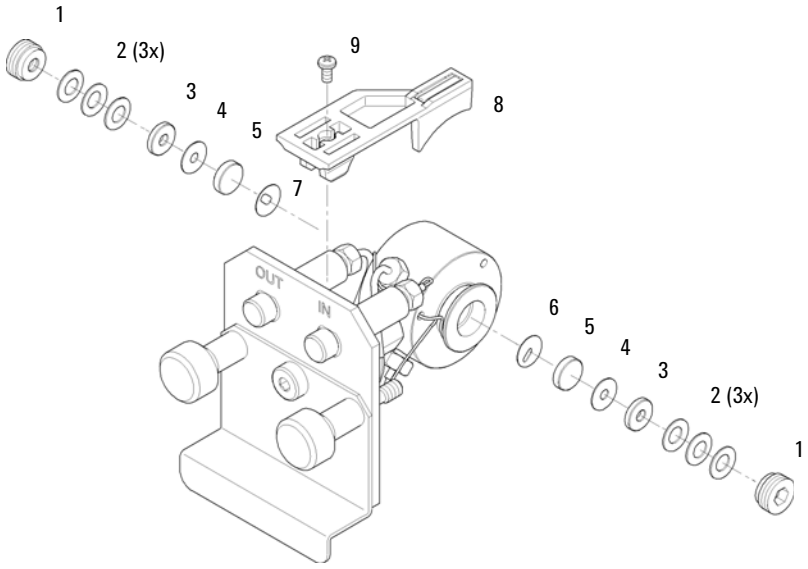


Figure 70 Semi-micro Flow Cell

High Pressure Flow Cell 10 mm / 14 µl

Item	p/n	Description
	G1314-60182	High pressure flow cell 10 mm, 14 µL (with RFID tag)
	G1315-87311	Capillary column – detector 380 mm lg, 0.17 i.d. includes items SST front ferrule (p/n 0100-0043), SST back ferrule (p/n 0100-0044) and SST Fitting (p/n 79814-22406) (not assembled)
1	79853-27200	Cell screw
	G1314-65054	Cell kit Agilent, comprises: two windows, two KAPTON gaskets and two PEEK rings
2	79853-68739	Ring PEEK kit
3	79853-68734	Window quartz kit
4	G1314-65055	Gasket kit, KAPTON
5	G1314-44010	Clip for RFI ID tag
6	0515-4780	Screw for Clip, M2.2, 4.5 mm long

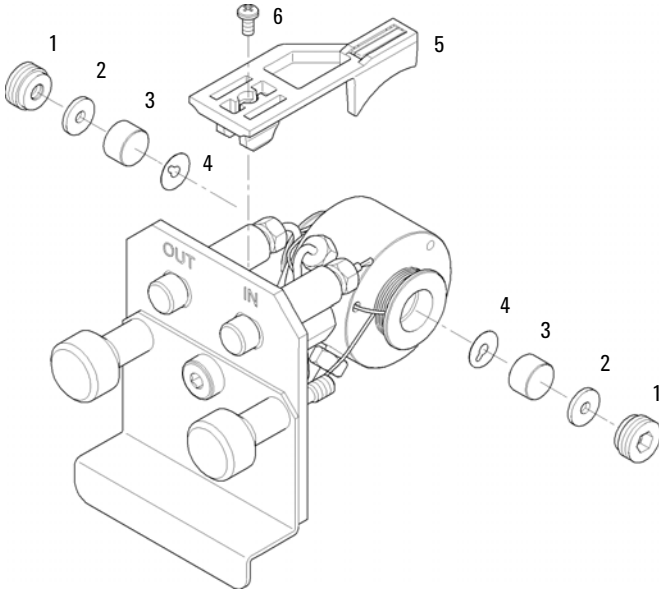


Figure 71 High Pressure Flow Cell

Cuvette Holder

For information the use of the cuvette holder, refer to “Using the Cuvette Holder” on page 178.

p/n	Description
G1314-60200	Cuvette Holder

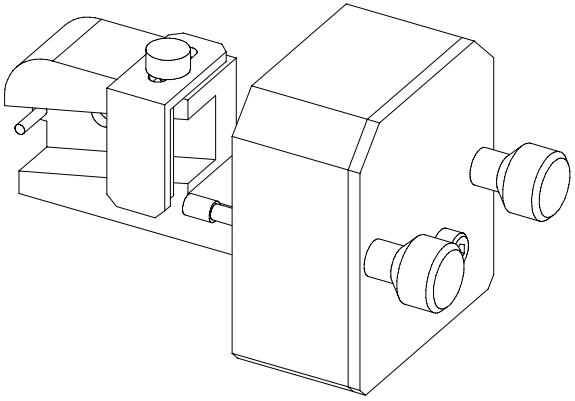


Figure 72 Cuvette Holder

Accessory Kit

Accessory kit (p/n G1314-68755) contains some accessories and tools needed for installation and repair of the module.

p/n	Description
0100-1516	Fitting male PEEK, 2/pk
5062-8535	Waste accessory kit
5063-6527	Tubing assembly i.d. 6 mm, o.d. 9 mm, 1.2 m (to waste)
5181-1516	CAN cable, Agilent module to module, 0.5 m

12 Identifying Cables

Cable Overview 200
Analog Cables 202
Remote Cables 204
BCD Cables 207
CAN/LAN Cables 209
RS-232 Cable Kit 210

This chapter provides information on cables used with the Agilent modules.

Cable Overview

NOTE Never use cables other than the ones supplied by Agilent Technologies to ensure proper functionality and compliance with safety or EMC regulations.

Analog cables

p/n	Description
35900-60750	Agilent module to 3394/6 integrators
35900-60750	Agilent 35900A A/D converter
01046-60105	Analog cable (BNC to general purpose, spade lugs)

Remote cables

p/n	Description
03394-60600	Agilent module to 3396A Series I integrators
	3396 Series II / 3395A integrator, see details in section "Remote Cables" on page 204
03396-61010	Agilent module to 3396 Series III / 3395B integrators
5061-3378	Agilent module to Agilent 35900 A/D converters (or HP 1050/1046A/1049A)
01046-60201	Agilent module to general purpose

BCD cables

p/n	Description
03396-60560	Agilent module to 3396 integrators
G1351-81600	Agilent module to general purpose

CAN cables

p/n	Description
5181-1516	CAN cable, Agilent module to module, 0.5 m
5181-1519	CAN cable, Agilent module to module, 1 m

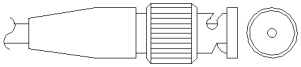
LAN cables

p/n	Description
5023-0203	Cross-over network cable, shielded, 3 m (for point to point connection)
5023-0202	Twisted pair network cable, shielded, 7 m (for point to point connection)

RS-232 cables

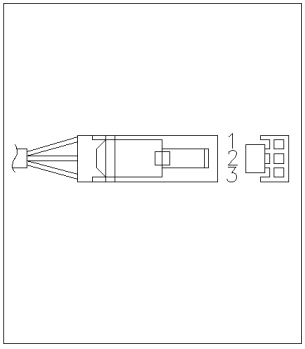
p/n	Description
G1530-60600	RS-232 cable, 2 m
RS232-61600	RS-232 cable, 2.5 m Instrument to PC, 9-to-9 pin (female). This cable has special pin-out, and is not compatible with connecting printers and plotters. It's also called "Null Modem Cable" with full handshaking where the wiring is made between pins 1-1, 2-3, 3-2, 4-6, 5-5, 6-4, 7-8, 8-7, 9-9.
5181-1561	RS-232 cable, 8 m

Analog Cables

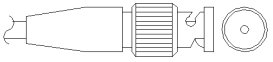


One end of these cables provides a BNC connector to be connected to Agilent modules. The other end depends on the instrument to which connection is being made.

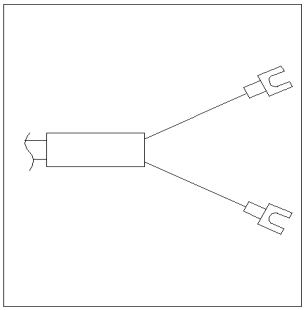
Agilent Module to 3394/6 Integrators

p/n 35900-60750	Pin 3394/6	Pin Agilent module	Signal Name
	1		Not connected
	2	Shield	Analog -
	3	Center	Analog +

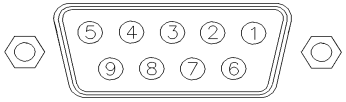
Agilent Module to BNC Connector

p/n 8120-1840	Pin BNC	Pin Agilent module	Signal Name
	Shield	Shield	Analog -
	Center	Center	Analog +

Agilent Module to General Purpose

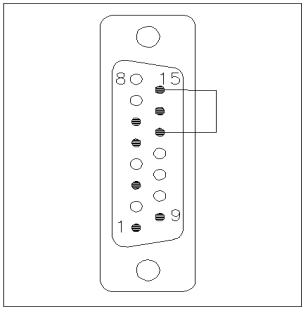
p/n 01046-60105	Pin 3394/6	Pin Agilent module	Signal Name
	1		Not connected
	2	Black	Analog -
	3	Red	Analog +

Remote Cables



One end of these cables provides a Agilent Technologies APG (Analytical Products Group) remote connector to be connected to Agilent modules. The other end depends on the instrument to be connected to.

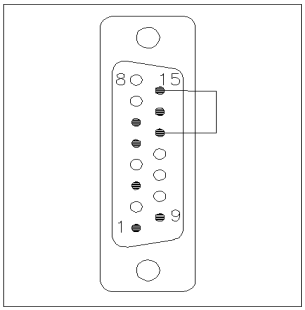
Agilent Module to 3396A Integrators

p/n 03394-60600	Pin 3394	Pin Agilent module	Signal Name	Active (TTL)
	9	1 - White	Digital ground	
	NC	2 - Brown	Prepare run	Low
	3	3 - Gray	Start	Low
	NC	4 - Blue	Shut down	Low
	NC	5 - Pink	Not connected	
	NC	6 - Yellow	Power on	High
	5,14	7 - Red	Ready	High
	1	8 - Green	Stop	Low
	NC	9 - Black	Start request	Low
	13, 15		Not connected	

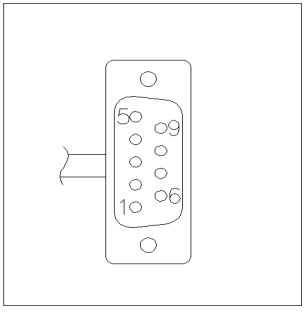
Agilent Module to 3396 Series II / 3395A Integrators

Use the cable Agilent module to 3396A Series I integrators (p/n 03394-60600) and cut pin #5 on the integrator side. Otherwise the integrator prints START; not ready.

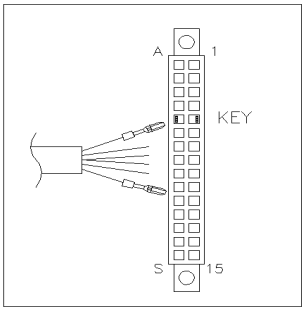
Agilent Module to 3396 Series III / 3395B Integrators

p/n 03396-61010	Pin 33XX	Pin Agilent module	Signal Name	Active (TTL)
	9	1 - White	Digital ground	
	NC	2 - Brown	Prepare run	Low
	3	3 - Gray	Start	Low
	NC	4 - Blue	Shut down	Low
	NC	5 - Pink	Not connected	
	NC	6 - Yellow	Power on	High
	14	7 - Red	Ready	High
	4	8 - Green	Stop	Low
	NC	9 - Black	Start request	Low
	13, 15		Not connected	

Agilent Module to Agilent 35900 A/D Converters

p/n 5061-3378	Pin 35900 A/D	Pin Agilent module	Signal Name	Active (TTL)
	1 - White	1 - White	Digital ground	
	2 - Brown	2 - Brown	Prepare run	Low
	3 - Gray	3 - Gray	Start	Low
	4 - Blue	4 - Blue	Shut down	Low
	5 - Pink	5 - Pink	Not connected	
	6 - Yellow	6 - Yellow	Power on	High
	7 - Red	7 - Red	Ready	High
	8 - Green	8 - Green	Stop	Low
	9 - Black	9 - Black	Start request	Low

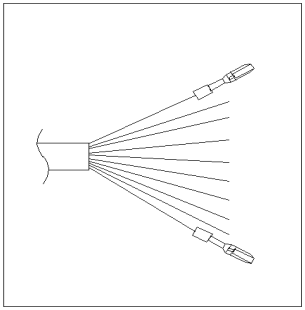
Agilent Module to General Purpose

p/n 01046-60201	Pin Universal	Pin Agilent module	Signal Name	Active (TTL)
		1 - White	Digital ground	
		2 - Brown	Prepare run	Low
		3 - Gray	Start	Low
		4 - Blue	Shut down	Low
		5 - Pink	Not connected	
		6 - Yellow	Power on	High
		7 - Red	Ready	High
		8 - Green	Stop	Low
		9 - Black	Start request	Low

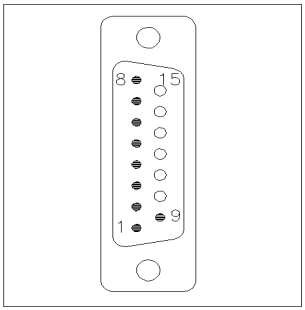
BCD Cables

One end of these cables provides a 15-pin BCD connector to be connected to the Agilent modules. The other end depends on the instrument to be connected to

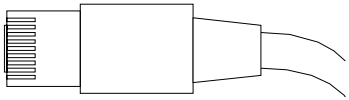
Agilent Module to General Purpose

p/n G1351-81600	Wire Color	Pin Agilent module	Signal Name	BCD Digit
	Green	1	BCD 5	20
	Violet	2	BCD 7	80
	Blue	3	BCD 6	40
	Yellow	4	BCD 4	10
	Black	5	BCD 0	1
	Orange	6	BCD 3	8
	Red	7	BCD 2	4
	Brown	8	BCD 1	2
	Gray	9	Digital ground	Gray
	Gray/pink	10	BCD 11	800
	Red/blue	11	BCD 10	400
	White/green	12	BCD 9	200
	Brown/green	13	BCD 8	100
	not connected	14		
	not connected	15	+ 5 V	Low

Agilent Module to 3396 Integrators

p/n 03396-60560	Pin 3396	Pin Agilent module	Signal Name	BCD Digit
	1	1	BCD 5	20
	2	2	BCD 7	80
	3	3	BCD 6	40
	4	4	BCD 4	10
	5	5	BCD0	1
	6	6	BCD 3	8
	7	7	BCD 2	4
	8	8	BCD 1	2
	9	9	Digital ground	
	NC	15	+ 5 V	Low

CAN/LAN Cables



Both ends of this cable provide a modular plug to be connected to Agilent modules CAN or LAN connectors.

CAN Cables

p/n	Description
5181-1516	CAN cable, Agilent module to module, 0.5 m
5181-1519	CAN cable, Agilent module to module, 1 m

LAN Cables

p/n	Description
5023-0203	Cross-over network cable, shielded, 3 m (for point to point connection)
5023-0202	Twisted pair network cable, shielded, 7 m (for point to point connection)

RS-232 Cable Kit

p/n	Description
G1530-60600	RS-232 cable, 2 m
RS232-61600	RS-232 cable, 2.5 m Instrument to PC, 9-to-9 pin (female). This cable has special pin-out, and is not compatible with connecting printers and plotters. It's also called "Null Modem Cable" with full handshaking where the wiring is made between pins 1-1, 2-3, 3-2, 4-6, 5-5, 6-4, 7-8, 8-7, 9-9.
5181-1561	RS-232 cable, 8 m

13
Appendix

General Safety Information 212
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Sound Emission 216
UV-Radiation 217
Solvent Information 218
Declaration of Conformity for HOX2 Filter 220
Agilent Technologies on Internet 221

This chapter provides addition information on safety, legal and web.

General Safety Information

The following general safety precautions must be observed during all phases of operation, service, and repair of this instrument. Failure to comply with these precautions or with specific warnings elsewhere in this manual violates safety standards of design, manufacture, and intended use of the instrument. Agilent Technologies assumes no liability for the customer's failure to comply with these requirements.

WARNING

Ensure the proper usage of the equipment.

The protection provided by the equipment may be impaired.

➔ The operator of this instrument is advised to use the equipment in a manner as specified in this manual.

Safety Standards

This is a Safety Class I instrument (provided with terminal for protective earthing) and has been manufactured and tested according to international safety standards.

Operation

Before applying power, comply with the installation section. Additionally the following must be observed.

Do not remove instrument covers when operating. Before the instrument is switched on, all protective earth terminals, extension cords, auto-transformers, and devices connected to it must be connected to a protective earth via a ground socket. Any interruption of the protective earth grounding will cause a potential shock hazard that could result in serious personal injury. Whenever it is likely that the protection has been impaired, the instrument must be made inoperative and be secured against any intended operation.

Make sure that only fuses with the required rated current and of the specified type (normal blow, time delay, and so on) are used for replacement. The use of repaired fuses and the short-circuiting of fuse holders must be avoided.

Some adjustments described in the manual, are made with power supplied to the instrument, and protective covers removed. Energy available at many points may, if contacted, result in personal injury.

Any adjustment, maintenance, and repair of the opened instrument under voltage should be avoided whenever possible. When inevitable, this has to be carried out by a skilled person who is aware of the hazard involved. Do not attempt internal service or adjustment unless another person, capable of rendering first aid and resuscitation, is present. Do not replace components with power cable connected.

Do not operate the instrument in the presence of flammable gases or fumes. Operation of any electrical instrument in such an environment constitutes a definite safety hazard.

Do not install substitute parts or make any unauthorized modification to the instrument.

Capacitors inside the instrument may still be charged, even though the instrument has been disconnected from its source of supply. Dangerous voltages, capable of causing serious personal injury, are present in this instrument. Use extreme caution when handling, testing and adjusting.

When working with solvents please observe appropriate safety procedures (e.g. goggles, safety gloves and protective clothing) as described in the material handling and safety data sheet by the solvent vendor, especially when toxic or hazardous solvents are used.

Safety Symbols

Table 33 Safety Symbols

Symbol	Description
	The apparatus is marked with this symbol when the user should refer to the instruction manual in order to protect risk of harm to the operator and to protect the apparatus against damage.
	Indicates dangerous voltages.
	Indicates a protected ground terminal.
	Indicates eye damage may result from directly viewing the light produced by the deuterium lamp used in this product.
	The apparatus is marked with this symbol when hot surfaces are available and the user should not touch it when heated up.

WARNING

A WARNING

alerts you to situations that could cause physical injury or death.

➔ Do not proceed beyond a warning until you have fully understood and met the indicated conditions.

CAUTION

A CAUTION

alerts you to situations that could cause loss of data, or damage of equipment.

➔ Do not proceed beyond a caution until you have fully understood and met the indicated conditions.

Radio Interference

Cables supplied by Agilent Technologies are screened to provide optimized protection against radio interference. All cables are in compliance with safety or EMC regulations.

Test and Measurement

If test and measurement equipment is operated with unscreened cables, or used for measurements on open set-ups, the user has to assure that under operating conditions the radio interference limits are still met within the premises.

Sound Emission

Manufacturer's Declaration

This statement is provided to comply with the requirements of the German Sound Emission Directive of 18 January 1991.

This product has a sound pressure emission (at the operator position) < 70 dB.

- Sound Pressure Lp < 70 dB (A)
- At Operator Position
- Normal Operation
- According to ISO 7779:1988/EN 27779/1991 (Type Test)

UV-Radiation

Emissions of ultraviolet radiation (200-315 nm) from this product is limited such that radiant exposure incident upon the unprotected skin or eye of operator or service personnel is limited to the following TLVs (Threshold Limit Values) according to the American Conference of Governmental Industrial Hygienists:

Table 34 UV-Radiation Limits

Exposure/day	Effective Irradiance
8 hours	0.1 µW/cm^2
10 minutes	5.0 µW/cm^2

Typically the radiation values are much smaller than these limits:

Table 35 UV-Radiation Typical Values

Position	Effective Irradiance
Lamp installed, 50-cm distance	average 0.016 µW/cm^2
Lamp installed, 50-cm distance	maximum 0.14 µW/cm^2

Solvent Information

Observe the following recommendations on the use of solvents.

Flow Cell

Avoid the use of alkaline solutions (pH > 9.5) which can attack quartz and thus impair the optical properties of the flow cell.

Prevent any crystallization of buffer solutions. This will lead into a blokkage/damage of the flow cell.

If the flow cell is transported while temperatures are below 5 degree C, it must be assured that the cell is filled with alcohol.

Aqueous solvents in the flow cell can built up algae. Therefore do not leave aqueous solvents sitting in the flow cell. Add small % of organic solvents (e.g. Acetonitrile or Methanol ~5%).

Solvents

Brown glass ware can avoid growth of algae.

Always filter solvents, small particles can permanently block the capillaries. Avoid the use of the following steel-corrosive solvents:

- Solutions of alkali halides and their respective acids (for example, lithium iodide, potassium chloride, and so on).
- High concentrations of inorganic acids like nitric acid, sulfuric acid especially at higher temperatures (replace, if your chromatography method allows, by phosphoric acid or phosphate buffer which are less corrosive against stainless steel).
- Halogenated solvents or mixtures which form radicals and/or acids, for example:

  $2CHCl_3 + O_2 \rightarrow 2COCl_2 + 2HCl$

  This reaction, in which stainless steel probably acts as a catalyst, occurs quickly with dried chloroform if the drying process removes the stabilizing alcohol.

- Chromatographic grade ethers, which can contain peroxides (for example, THF, dioxane, di-isopropylether) such ethers should be filtered through dry aluminium oxide which adsorbs the peroxides.
- Solutions of organic acids (acetic acid, formic acid, and so on) in organic solvents. For example, a 1-% solution of acetic acid in methanol will attack steel.
- Solutions containing strong complexing agents (for example, EDTA, ethylene diamine tetra-acetic acid).
- Mixtures of carbon tetrachloride with 2-propanol or THF.

Declaration of Conformity for HOX2 Filter

Declaration of Conformity

We herewith inform you that the

Holmium Oxide Glass Filter

used in Agilents absorbance detectors listed in the table below meets the requirements of National Institute of Standards and Technology (NIST) to be applied as certified wavelength standard.

According to the publication of NIST in J. Res. Natl. Inst. Stand. Technol. 112, 303-306 (2007) the holmium oxide glass filters are inherently stable with respect to the wavelength scale and need no recertification. The expanded uncertainty of the certified wavelength values is 0.2 nm.

Agilent Technologies guarantees, as required by NIST, that the material of the filters is holmium oxide glass representing the inherently existent holmium oxide absorption bands.

Test wavelengths:

Product Number	Series	Measured Wavelength *	Wavelength Accuracy	Optical Bandwidth
79883A	1090	361.0 nm 418.9 nm 453.7 nm 536.7 nm	+/- 1 nm	2 nm
79854A	1050			
G1306A	1050			
G1315A, G1365A	1100			
G1315B/C, G1365B/C	1100 / 1200 / 1260			
G1600A, G7100A	CE			
79853C	1050	360.8nm 418.5nm 536.4nm	+/- 2 nm	6 nm
G1314A/B/C G1314D/E/F	1100 / 1200 / 1260	360.8nm 418.5nm 536.4nm	+/- 1 nm	6 nm
G4286,..., 90A/B/C	1120 / 1220			

*) The variation in Measured Wavelength depends on the different Optical Bandwidth.

May 19, 2010

(Date)

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(R&D Manager)

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In This Book

This manual contains technical reference information about the Agilent 1290 Infinity Variable Wavelength Detector (G1314E), the Agilent 1260 Infinity Variable Wavelength Detector (G1314F) and the Agilent 1200 series Variable Wavelength Detector (G1314D) (obsolete).

The manual describes the following:

- introduction and specifications,
- installation,
- using and optimizing,
- troubleshooting and diagnose,
- maintenance and repair,
- parts identification,
- hardware information,
- safety and related information.

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